A Database Publication

THE MICRO USER

Volume 4
Number 10
December 1986
£1.25

Top-selling guide to the BBC Micro!

THE MICRO USER NEWS

Disc drive prices: Big rises on way

EDUCATION MICRO USER

Classroom role for the Master Compact

BUSINESS MICRO USER

BBC Micro that runs a language centre

MAKE YOUR MICRO TALK...

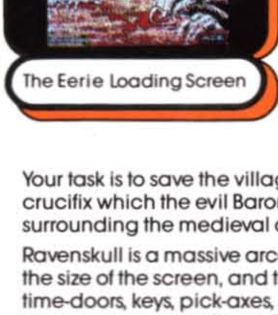
UTILITIES: Fast Flood Fill, Fast Scroller, Break Recovery

REVIEWS: Advanced 1770 DFS, Beeb Digitiser, ViewSpell, Max

Festive Fun!

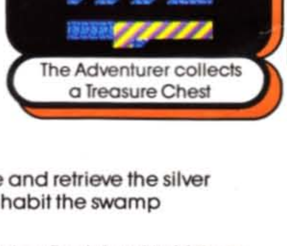
Help Santa load his sleigh . . . and test your powers of deduction . . . in our two great Christmas games

For the BBC MICRO ELECTRON
Ravenskull


The Eerie Loading Screen

The Elf escapes from a Ravenbee

Close-up of a Crystal Ball


The Adventurer collects a Treasure Chest

Ravenskull Castle — The Fortress of Doom

Your task is to save the village of Austburg from imminent devastation. You must enter Ravenskull Castle and retrieve the silver crucifix which the evil Baron Strieg has stolen. Only then will Austburg be safe from the Zombies who inhabit the swamp surrounding the medieval castle.

Ravenskull is a massive arcade-adventure featuring smooth 4-way screen scrolling over the 4 levels of play. Each level is 64 times the size of the screen, and there is an initially-bewildering variety of game characters including: acid pools, man-eating plants, time-doors, keys, pick-axes, scythes, spades, bows and arrows, dynamite, bells, food and wine (beware! it may be poisonous or have strange side-effects). There are also several magical scrolls and potions to be found. These may be good or evil; for example the strength scroll gives you the power to push wooden casks, whereas the lightning-strike scroll is fatal if used.

The guardians of the castle, the vicious Ravenbees have to be avoided or, in some cases, destroyed — but there is only one way to kill them; you must discover how as you venture through the dank passages of the castle. Your quest is not an easy one — only with time, experience and a little luck will you unravel all the mysteries within Ravenskull Castle.

PRIZE COMPETITION

If you are skilful enough to complete Ravenskull, you can enter our prize competition. The prizes include a £100 first-prize, with Superior Software T-shirts for runners-up.

PRICES

Electron cassette	£9.95	BBC Micro disc (5¼")	£11.95
BBC Micro cassette	£9.95		

Ravenskull is compatible with the BBC B, B+, Master

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ACORNSOFT

The screen pictures above show the BBC Micro version of Ravenskull.

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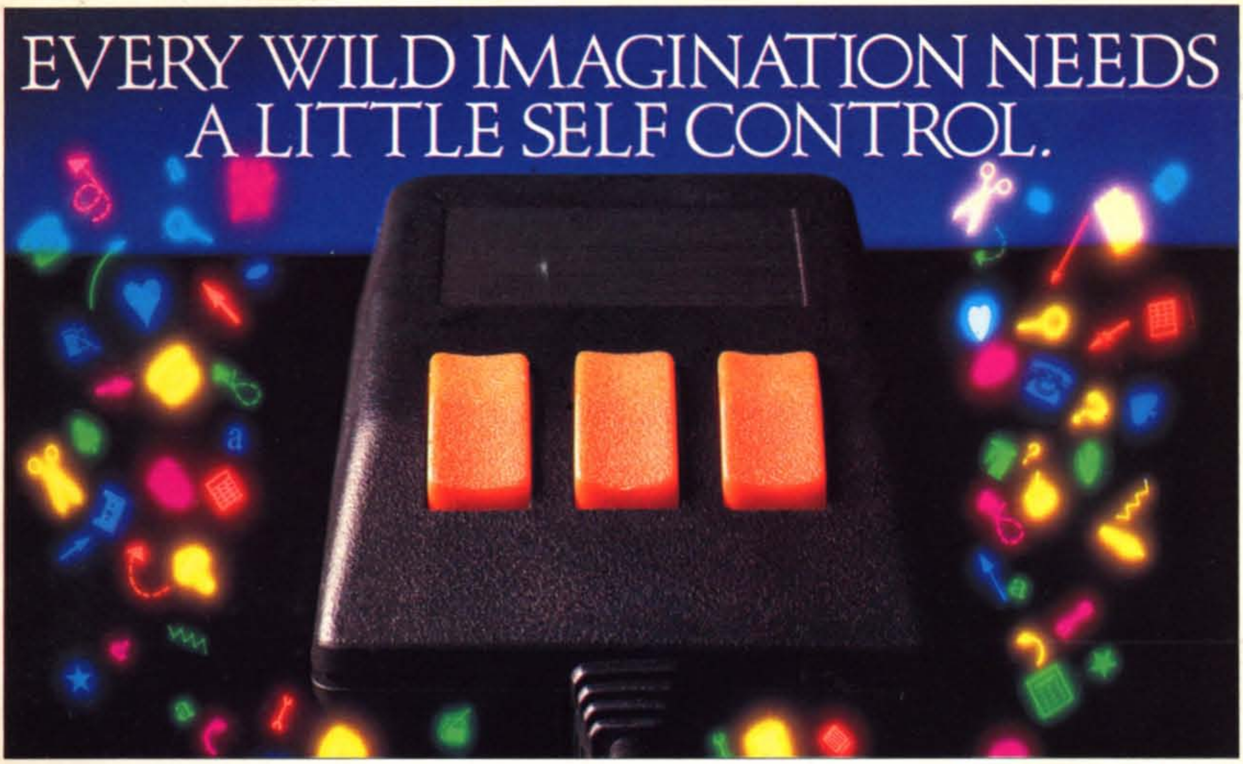
EVERY WILD IMAGINATION NEEDS A LITTLE SELF CONTROL.



As a BBC Micro user, you enjoy some pretty sophisticated equipment.

So it's a pity if you are still missing that sophisticated, positive control your equipment deserves.

There's not much joy in a joystick, and keyboards can be all fingers and thumbs. Frustrating, especially when your imagination is much faster than your fingers!

What you need is an AMX Mouse.

Already thousands of BBC Micro users have adopted an AMX Mouse and wouldn't be without it.

We didn't claim it was 'the best input device'. The press said it for us.

In fact it has received outstanding critical acclaim, and no wonder!

The AMX Mouse brings to BBC Model B, B+ and Master 128 users, the same freedom and versatility which has, up to now, been the exclusive province of much more expensive computers.

In fact, it's no surprise that nearly all the new 16 bit 'State of the Art' computers now come with a mouse as standard. Proof, if proof were needed, that the Mouse is here to stay.

COMPATIBLE WITH MASTER 128

The AMS range of Mouse software includes, AMX Art, AMX Utilities, AMX Pagemaker, AMX Super Art/Rom, AMX Paintpot, AMX Desk, AMX Data Base, AMX 3D Zicon, AMX XAM.

There is also a growing list of programs available from other leading software houses, which utilize the Mouse, including, Colour Art from Watford, Mini Office II from Database, Novocad from Technomatic, Icon Master from Beebug, Compas Starter CAD system from British Thornton, CAD Soft from CAD Soft, Solidesk from Solidisk, and Mode 7 Art from Tubelink and of course View and Wordwise are also compatible, many more titles will be available soon.

Now there are three great ways for you to get into a perfect Mouse Environment!

AMX Super Art & Super Rom (Mouse, Keyboard & Joystick compatible) £49.95.

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Isn't it about time you trapped an AMX Mouse?

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Vol. 4. No. 10 December 1986

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Jan-June 1986

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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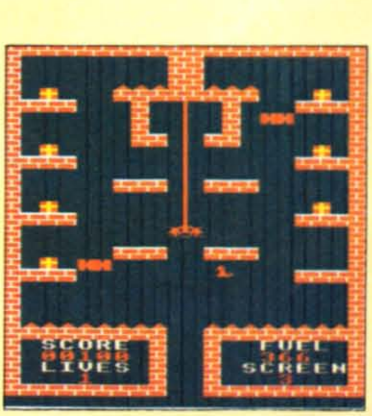

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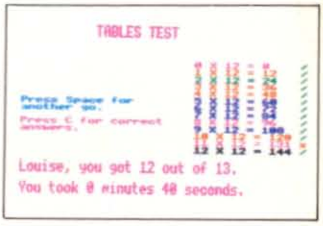

```
TABLES TEST

Press Space for
another go.
Press C for correct
answers.

Louise, you got 12 out of 13.
You took 0 minutes 40 seconds.
```

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Our experts cast a critical eye over some of the latest educational releases for the BBC Micro.

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G.P.D. SYSTEMS

31 ABBEY ROAD
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DISC DRIVES

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Single 400k DS	£112	£128.80
Dual 800k DS	£205	£235.75
Dual 800k horizontally mounted in a monitor stand. Fits both the BBC and Master series.	£235	£270.25
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Single 400k DS Without PSU	£85	£97.75
Dual 800k DS Without PSU	£168	£193.20
Single 400k DS With PSU	£101	£116.15
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A 20Mg byte hard disc for the BBC using the ADFS. Includes 20MgB hard disc, independent PSU and cooling fan, Winchester controller card and BBC host adapter card.	£499	£573.85

SPECIAL OFFER
5 free discs with every single drive
10 free discs with every dual drive

Offer ends 15th December 1986

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PRINTERS

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Taxan KP810 30cps NLQ 140 Draft	£214	£246.10
Shinwa CP80A 100cps Draft	£160	£184.00
Epson LX86 28cps NLQ 120cps Draft	£225	£258.75
Juki 6100 Daisywheel	£240	£276.00

SPECIAL OFFER

Quendata 1120 Daisywheel (includes spare ribbon worth £7)	£140	£161.00

MONITORS

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Philips Monochrome green, anti-glare	£69	£79.35
Taxan 14" std res colour	£195	£224.25
Taxan Supervision III high res colour	£315	£362.25
Microvitec 1451 med res colour	£230	£264.50
Mitsubishi 1404 medium res	£210	£241.50
Ideal Xmas Gift		
Philips TV/Monitor, gives true monitor performance but with 10 pre select TV channels	£172	£197.80

COMPUTERS

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Master 'Compact' New BBC system with integral 3.5" disc and separate keyboard. 128k RAM. Comes complete with a wide range of software. View, Logotron Desk Top Utilities.		
Base unit (Computer + Single Drive)	£385	£442.74
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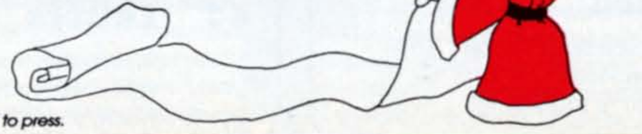
Base unit + monochrome monitor	£465	£534.75
Base unit + colour monitor	£595	£684.25
Second 3.5" Disc Unit	£100	£115.00
BBC MASTER 128k with VIEW and other free software	£390	£448.50
BBC+ 64k (price subject to availability)	£350	£402.50
ADFS Upgrade with manual	£26	£29.90
Word Processing Package		
Master 128 with View and Viewsheet, Dual 800k Disc Drive, High Res Green Monitor, Daisywheel Printer, Paper, Discs and all cables	£787	£905.05
Master Compact with View, Single Drive, Colour Monitor and Daisywheel Printer	£705	£810.75

Dear Santa
Could you
try to fit
my chip

SPECIAL LATE NIGHT LINE
We have opened a special evening enquiry and order telephone line from 5.30pm to 9.00pm every evening
Phone at your leisure: 02774 55076



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Large selection of educational and business software.

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Export orders welcome

All prices correct at time of going to press.

THE MICRO USER NEWS
December 1986

Disc drive prices are due to rocket

A WARNING has gone out to BBC Micro users that the price of disc drives is about "to go through the roof".

The message that is coming over loud and clear is: Buy now or pay more later.

A survey has shown that the current wholesale price of disc drives in the UK is around 40 per cent higher than at this time last year.

The main reason for this is the poor showing of the pound against the Japanese yen – a situation that is unlikely to improve in the immediate future.

"Last year saw 400k drives on sale for as little as £80, whereas now you're looking at an RRP of around the £120 mark", says Barry Rubery of Pace Micro Technology.

"The situation is now completely out of our control".

Spokesmen for several other disc drive suppliers told *The Micro User* that this was the case. "If BBC Micro owners want to buy a disc drive, they had better buy now", said a representative of Middlesex-based Twillstar.

However at least one dissenter could be found in the form of one of the leading suppliers in the market.

Watford Electronics has in fact shown an overall reduction in its disc drive price range of seven per cent since last year.

Nor has the firm any intention of imposing a price increase in the immediate future.

"We intend to keep our prices down as long as we possibly can", a Watford spokesman told *The Micro User*.

"Naturally we are subject to problems with the pound just like anyone else, so there is no way any price guarantees can be given.

"However we hope to stay ahead of the game as we normally do by buying at the right price. That's the key".

ALL GO AT THE SHOW

ONCE again the vast army of BBC Micro users north of Watford turned out in force to ensure the latest Manchester Electron & BBC Micro User Show was an enormous success.

Exhibitors too reported an extremely successful three days trading.

"The show proved to us that the northern BBC Micro user is as enthusiastic as ever", said Nick Pearson of AMS.

"We sold our entire supply of AMX Pagemaker on the first day and rushed back to base to re-stock".

Another happy man was Paul Beverley of Norwich Computer Services who unveiled three new Wordwise Plus support programs – Videoscript, Footnotes and Fractions.

Like the other two programs, Videoscript uses the Wordwise Plus segment programming language to manipulate text into columnar format.

"Up to three columns are supported and Videoscript allows Wordwise Plus users to easily create their own newspaper-style printouts", said Beverley.

As an aid to editors and students, Footnotes allows user-controlled insertion of margin and page notes into a Wordwise Plus text file – useful, for example, in English language and literature study courses, as well as an aide memoire for text file creation and editing.

Fractions is an easy-to-use patch routine for on-screen display and printing of fractions from within Wordwise Plus – symbols that are not normally available in Wordwise Plus files.

Videoscript sells for £12, Footnotes for £10 and Fractions for £8.

Care Electronics had several new cartridge rom products for the Master series on view.

Using a £10.81 cartridge extender, Master owners can plug the existing range of low profile rom cartridges from Care into their machines.

At £2 each the cartridges compare favour-

Turn to Page 9

Santa goes on-line

MESSAGES to Father Christmas need not be subjected to the vagaries of the postal service this year.

To ensure that it is possible for every child to contact him before the big day, the jolly old fellow has gone on-line up at the North Pole.

Equipped with a BBC Micro no less, Santa has electronically hooked himself up to a giant computer here in the UK.

Now all that kiddies – or their parents – have to do to contact him is to transmit their message via any home or office micro.

SantaLink is the latest service being offered to subscribers to MicroLink, the UK's fastest growing electronic mail service.

All they have to do is type SANTA at the prompt when they go on-line and then enter their message.

And Father Christmas is guaranteeing that each message he receives will get through – and be sent an answer – right up to Christmas Eve when he leaves to deliver the presents.

BOOST FOR COMPACT

THE windfall from profit-taking on TSB shares could be one reason why the new Compact is selling in such large quantities.

"The machine is doing very well in the shops", says Acorn marketing chief Bob Coates.

"There seems to be a lot of money around in the consumer market at the moment – a lot of it in the pockets of people who've taken a quick profit on their TSB share issue.

"This has been very good for us at a time when we are running an extensive and costly advertising campaign".

MICROMAN Computers

ACORN SPECIALIST COMPUTER CENTRE

All our prices include VAT.

APPOINTED WATFORD DEALER

Microman has been appointed a Watford Dealer. We are stocking a large range of Watford products, including the popular BEEB DIGITIZER, MAGAZINE MAKER, 32K SHADOW RAM CARD, RAM/ROM CARDS, DFS UPGRADES and many more available from our shop.

BBC MASTER SERIES	
Master 128	475.00
Master Turbo Module	125.00
Master 512 Upgrade	399.00

MASTER ROM CARTRIDGES	
ISO Pascal	69.00
Logo	69.00

BBC MASTER COMPACT SERIES	
Master Compact + TV Modulator	458.85
Master Compact + Green Monitor	539.35
Master Compact + Colour Monitor	688.85
Compact Software	Phone for new list

ACORN PERIPHERALS	
800K Dual Disc Drive + Stand	316.00
Teletext Receiver	99.00
Prestel Receiver	139.00
6502 2nd Processor	199.00
IEEE Interface	325.00

BBC B and B+ DISC INTERFACES	
Acorn 8271 0.9 Disc Interface	59.80
Acorn DNFS ROM	20.60
Acorn 1770 Disc Interface	49.95
Acorn ADFS ROM	29.99
Watford Single Density DFS	62.10
Solidisk DDFS 2-2 Interface	35.00

RAM/ROM SHADOW EXPANSION	
Watford Expansion Boards	Large range in stock
Aries B12 Sideways ROM Board	46.00
Aries B12c Adapter	5.75
Aries B32 RAM Extension Board	92.00
ATPL Sidewide ROM Board	43.70

EPROM PROGRAMMERS/ERASERS	
Control Telemetry Eprom Prog.	109.25
Uviprom EPROM Prog.	20.95
Uviprom EPROM Prog. + ZIF	25.95
Uviprom 32k EPROM Prog. + ZIF	25.95
Uviprom ROM Software	5.00
Uviprom SWR Disc Software	2.00
Uvipac EPROM Eraser	20.95
Uvipac EPROM Eraser + Timer	25.95

EPROMS/RAM	
Eproms 2764 8K	2.75
Eproms 27128 16K	3.45
27128 per 5 Eproms	16.50
RAM 6264LP-15 8K	3.95
27256 (12.5v)	5.95

MONITORS (inc BBC CABLE)	
Microvitec 1431 Std/Metal	229.00
Microvitec 1451 Med/Metal	279.00
Philips 1114 TV/Monitor/CV	209.00
Philips CMB8524 STL/RGB/CV	175.00
Philips CMB8533 Med/RGB/CV	299.00
Philips Green 7502	85.00
Philips Amber 7522	89.00

MODEMS/COMMUNICATIONS	
Pace Nightingale + Commstar	129.95
Pace Nightingale	113.85

PACE DISC DRIVE PRODUCTS	
Pace PSD3 400K 40-80T	128.95
Pace PDD3 800K 40-80T	249.95
Pace PDS3P 400K 40-80T + PSU	154.95
Pace PDD3P 800K 40-80T + PSU	286.95

PRINTERS	
Canon PW1080A	289.00
Star NL10 (No Interface)	239.00
Star NL10 + BBC/Cent Interface	278.00
Star SG15 Wide Carriage	389.00
Juki 6100 Daisywheel	299.00

PLOTTERS	
Roland DXY-880A A3 Plotter	P.O.A.
Roland DXY-980A A3 Plotter	1207.50
Watanabe MP1000 A3 Plotter	P.O.A.
Epson HI80 Plotter (4 pen)	458.85
Hitachi A3 Plotter (4 pen)	495.00
Microman Plotter ROM	29.95

DIGITISERS	
Graphpad II	75.50
Cherry Digitiser	632.50

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Bitstik 1	375.00
Bitstik Multi-plotter Driver	79.00
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Bitstik 2 Upgrade	460.00
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AMX Xam	24.95
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View 3.0 ROM	79.00
Viewspell ROM	39.95
Interword ROM	49.00
Wordwise Plus ROM	49.00
Watford Word-Aid	27.60

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Watford NLQ ROM for Epson	28.75
View Printer Driver for above	11.50
Hershey Font (Disc)	21.00
Clares Fontwise (Disc)	12.00
Clares Fontwise Plus (Disc)	20.00
Clares Fonteditor (Disc)	20.00
Fontaid ROM	30.00
Fontaid Utilities Disc A	15.00
Fontaid Utilities Disc B	15.00
Multi-Font NLQ	30.00

DATABASES + UTILITIES	
Viewstore ROM	52.00
Acorn Database (Disc)	15.35
Masterfile II (Disc)	22.00
Betabase	25.00

SPREADSHEETS/CHARTS	
Viewsheet ROM	52.00
Viewplot ROM	29.95
Ultracalc ROM	79.50
Intersheet ROM	49.95
Interchart ROM	33.95

PANASONIC KX-P1080 PRINTER

This well-built printer offers many advanced features. It provides both friction and tractor feed NLQ as well as draft modes and full Epson code compatibility. This special offer includes a BBC Cable. Further details on request.

£179.00

LANGUAGES	
BCPL ROM	59.80
BCPL Calculations	34.50
BCPL Stand Alone Generator	49.90
ISO Pascal ROM	59.95
ISO Pascal Stand Alone Gen.	34.50
Comal ROM	49.85
Acorn LOGO ROM	69.00
Logotron LOGO ROM	69.00
Micro-Prolog ROM	79.95

UTILITIES	
Acorn Basic Editor ROM	29.90
Acorn Termulator ROM	34.50
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Beebug	Full range
Caretaker Basic Utility ROM	33.35
System ADE ROM	60.00
System SPY ROM	30.00
Slave Plus ROM	39.95
Floppywise Plus ROM	29.95
Proc-Kit (Disc)	10.95
Loc-Kit (Disc)	25.00
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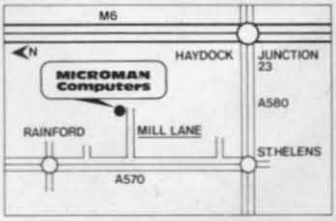


The incredible shrinking Beeb

LATEST product from Cambridge Microprocessor Systems is a micro that Gulliver might have appreciated.

Innovative design and extensive use of surface mount technology combine to make Microbeeb the smallest and most versatile single board computer to date, the company claims.

A multi-layer board measuring just 3.5in by 2.5in, Microbeeb has three times as many surface mount components underneath the board as there are conventional components on top.

Functions supported include 6502 compatible processor, three independent fully programmable serial channels, RS422/423 serial interface and high speed synchronous serial interface.

It has two independent stepper motor outputs, four analogue input channels, 35 independent user definable input/output ports, liquid crystal display interface driver, six programmable counter timers, real time calendar timers and real time timers, real time calendar clock and pulse width modulation facility.

battery backed ram, from 2k to 3Mb of eprom, 8MHz clock, 5 volt power supply, watchdog facility, rom filing system and full multi tasking.

Microbeeb supports a complete 40/80 column full colour video processor which provides an enhanced character set including teletext, over 400 user definable characters, pixel graphics, underline, flashing, reverse video, and 32k of paged ram. Video drivers are provided.

It can be programmed in Basic, Forth, Pascal or any other high level language and can be networked to up to 126 remote stations.

The manufacturer says the unique compositon of Microbeeb makes it suitable for virtually any control/monitoring task, from simple switching to applications requiring a complex video display. Price £49.95.

Mini powerpack – the Microbeeb

Northern Show

From Page 7

ably with the official Acorn product.

As with most other BBC rom cartridges, the Care system only supports 16k roms. For the latest series of 32k rom programs Care has released its twin Master rom cartridge, available with three combinations of ZIF and plug-in rom sockets, from £11.50.

Care said it will be releasing a plug-in eprom blower for the Master's cartridge slot in time for Christmas.

With the falling cost of ram chips, Opus was selling its Challenger disc drive/ram disc for £149.95 for the 256k version – £30 cheaper than usual. Buyers got a BBC double density interface, 400k disc drive and 256k ram disc unit.

Upgrades to 512k ram are available from Opus by mail order for £30.

Lecturers all smiles thanks to Micro User

TWO Manchester Polytechnic lecturers have suddenly found themselves with a thriving part-time business on their hands – thanks to *The Micro User*.

Andy Verwer and Leonard Golten have seen the computer aided design software they developed as a teaching aid become a hot commercial property of late.

Customers for one package known as Codas – control system design and simulation – now include such prestigious names as British Aerospace, British Nuclear Fuels, Vickers and Lucas.

And the Royal Greenwich Observatory is currently using Codas on a BBC Micro to help with the design of giant telescopes for the Canary Islands.

The two lecturers, who first met when Andy Verwer was a student of Leonard Golten's at Manchester Poly, have also had success with a package called PCS.

Used to simulate process plant control systems, it is now being used to train process operators at Shell Chemicals and ICI Organics Division.

Other packages concerned with signal analysis and digital control systems are in the pipeline.

Yet the two lecturers readily admit that their part-time business venture would never have got off the ground without *The Micro User*.

"All our sales to date have come from one ad we placed in the magazine earlier this year", said Andy Verwer, "so that certainly speaks well for its pulling power".

Three year ago

ANOTHER look back at what *The Micro User* covered just 36 months ago. This was the issue for December 1983:

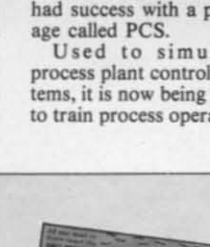
Encouraged by the huge sales of BBC Micros to the schools, new software companies have been proliferating – mostly set up by publishing houses. One of the most prestigious companies to enter the field is Cambridge University Press.

★ ★ ★

The coming BBC Micro User Show to be held at the Westminster Exhibition Centre will feature practical demonstrations of an inexpensive way to link up two micros. Also on show will be the BBC's recently-launched telesoftware service and the government-backed Micro Electronics Project will be displaying the latest in the world of educational computing.

★ ★ ★

Acorn pulls off Britain's largest chess sponsorship deal by backing the semi-finals of the world chess championships at a cost of £100,000. The deal is made in the face of rival bids from Holland and Austria and allows the British Chess Federation to stage the matches in London.



★ ★ ★

Two new pieces of hardware are released by Acorn. The first is the Bit Stik graphics system, an extremely sophisticated computer aided design package which allows the user to define a whole library of designs. Also on offer is an IEEE interface for the BBC Micro which makes the machine the first computer of its type to offer all of the standard I/O ports - RS423, Centronics and IEEE.

Software is a family affair...

NEW budget software house Code Masters is a real family affair.

Managing director is Jim Darling, head of A I Products when that company was responsible for writing Mastertronic software.

His partners are sons Richard, 18, and David, 20, award-winning programmers whose games have sold in excess of a million copies.

Their prodigious output includes The Last V8, Master of Magic and the highly successful Games Creator for Mirrorsoft.

"All Code Masters' releases will be top quality arcade action games, priced £1.99", promised Jim Darling.

"We see the BBC Micro market as a vital element in our strategy and will be publishing several titles for the BBC range before Christmas".

Partners David and Richard Darling

NEW MOUSE PACKAGE

MOUSE Pac from ATPL is a new AMX-compatible digital mouse-driven software package the company claims is "comparable if not better quality" than Super Art.

Consisting of mouse, two discs, and a rom containing mouse driver software, it runs on all BBC Micro and Master series.

The software includes a facility to select and save an AMX format screen from the larger Mouse Pac-generated picture.

Mouse Pac costs £48 complete, £29.95 for the mouse which can be used with AMX software, and £20 for the two discs and rom.

OFFICE PACKAGE IS No1

MINI Office II has followed its predecessor – the original Mini Office package – to the top of the best-selling charts.

It is now number one in the BBC Top Ten of the Gallup Chart which is published in Microscope and Popular Computing Weekly.

As such, it becomes only the second business package to achieve sales figures of sufficient volume to compete in the otherwise games-dominated league. The first was Mini Office.

A rom version of Mini Office II has recently been launched by Database Software for the BBC B, B+, Master and Compact.

Contained in four chips on one board, it allows immediate access to the six modules – word processor, database, spreadsheet, graphics, label printing and comms. The price is £59.95.

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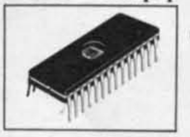
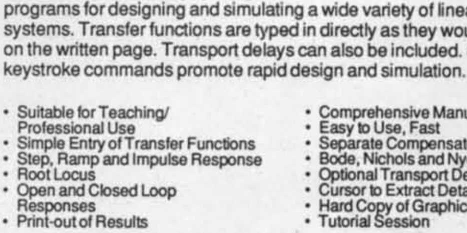


CODAS

Control System Design and Simulation

for the BBC



"CODAS" is a new, highly integrated, interactive and flexible suite of programs for designing and simulating a wide variety of linear dynamic systems. Transfer functions are typed in directly as they would appear on the written page. Transport delays can also be included. Single keystroke commands promote rapid design and simulation.

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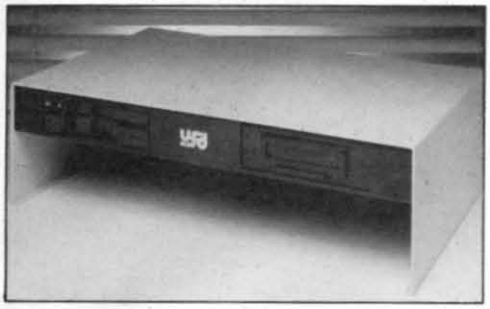


10 Mb back-up

LATEST product from Akhter is the Archive, a 1Mb floppy disc drive with a 10Mb tape streamer for back-up storage on the BBC Micro and Master series.

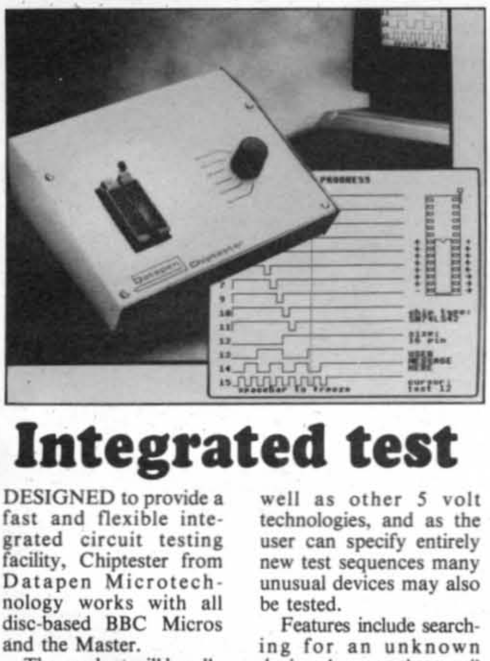
It is connected in the same way as a normal floppy disc drive.

This means it can be used in tandem with a Winchester connected to the 1MHz bus on the computer.

Not only can it back up a Winchester by making an identical copy of the entire disc, its hierarchical structure enables it to back up any individual directory or file.

For use as a normal disc drive, Archive includes a 40/80 track switchable floppy disc drive.

Price £866.



Integrated test

DESIGNED to provide a fast and flexible integrated circuit testing facility, Chiptester from Datapen Microtechnology works with all disc-based BBC Micros and the Master.

The product will handle all chip sizes up to 28 pin and widths from 0.3 to 0.6 in.

Both C-Mos and TTL families are catered for as well as other 5 volt technologies, and as the user can specify entirely new test sequences many unusual devices may also be tested.

Features include searching for an unknown device, loop testing until pass or failure occurs, and the display of voltage waveforms present on any of the pins during testing of the circuit.

Software could save thousands

SOFTWARE specially written for the BBC Micro is being used in a campaign which could save up to 20,000 lives a year in the UK.

Dr Peter Burridge, consultant anaesthetist at Birch Hill Hospital, Rochdale, wrote the program with the help of two colleagues.

It forms part of the resource material for the current Save a Life campaign which aims to teach everyone in the country what to do in a life-or-death emergency.

Each year in Britain about 60,000 people die suddenly, 80 per cent at home, and experts say one third of them could survive if they got proper attention right away.

As heart attacks are a major cause of sudden death, cardio pulmonary resuscitation forms an important part of the campaign's teaching.

Dr Burridge's program contains text instruction and multiple choice test questions aimed at teaching people how to keep heart attack victims alive during those vital minutes before the ambulance arrives.

It explains how to give emergency aid like mouth-to-mouth resuscitation techniques.

"The campaign is the basis for a BBC 1 television series and 2½ hour courses are being given all over the country", Dr Burridge told *The Micro User*.

"Our BBC Micro program aims to bring practical instruction to people who haven't seen the series or can't get to their local training centre. I am particularly concerned that it should get maximum exposure in schools.

"This is why we have left it unprotected and are supplying it on disc or tape for only £3".

'Robot' control in the home

AN add-on which puts the BBC Micro in charge of household appliances has been launched by General Information Systems.

The Red Box interface "represents the first significant step into home automation for the non-technically minded", says the company.

Red Boxes are programmed using the BBC Micro as a terminal to the system, which sends signals along the mains wiring of a house to control lighting, heating and other appliances powered from a 13 amp socket.

Detectors

The devices can also receive and react to signals from devices such as intruder and smoke detectors and temperature gauges.

Special wiring is not needed because all control information is transmitted along the standard domestic main.

Data modulates a mains-borne 129kHz carrier, a frequency set aside by the British Standards Institution for such applications.

Commstar upgrade launched

COMMSTAR II, the long-awaited successor to the acclaimed Commstar communications rom for the BBC Micro, has finally been launched by Pace Micro Technology.

After devoting most of the summer to improving the original, author Andy Hood claims the new version represents state of the art.

According to Hood the software differs from run of the mill terminal programs for the BBC Micro in that it offers AMX style pull down menus for user selection without leaving the on-line mode. It is also fully AMX Mouse compatible.

Commstar II comes as a 16k rom for the BBC Micro – twice the code used on the original – and retails for £24, the same price as Commstar I.

Repton updated

AN updated version of the bestselling Repton games for the BBC Micro has been launched by Superior Software.

Repton 3 offers 24 screens and a host of new features allowing the user for the first time to design screens and monsters, even to re-define the existing characters.

Those lucky enough to complete the epic adventure will be able to enter a competition with a chance of winning more than £200.

Repton 3 is available for the BBC Micro on disc at £11.95 or cassette £9.95

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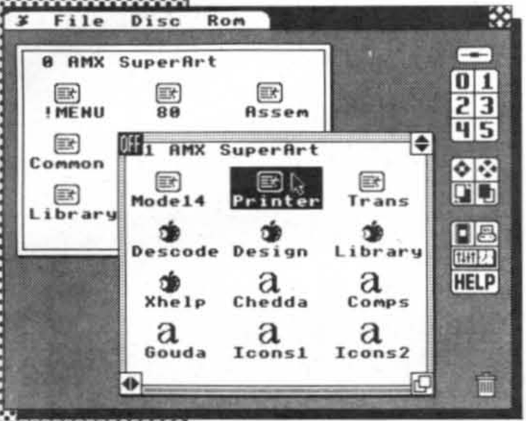
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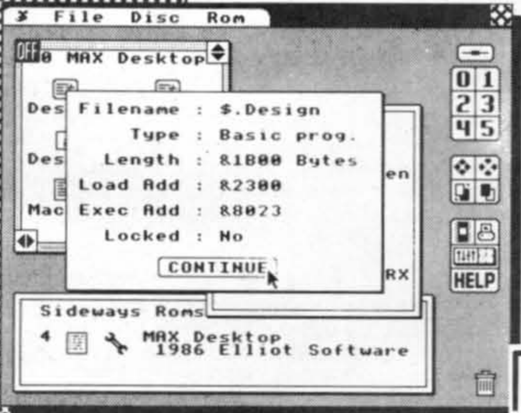
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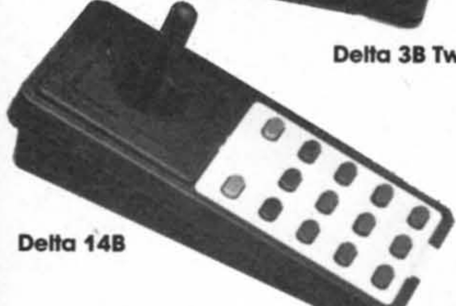
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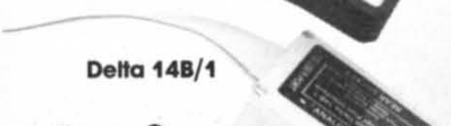
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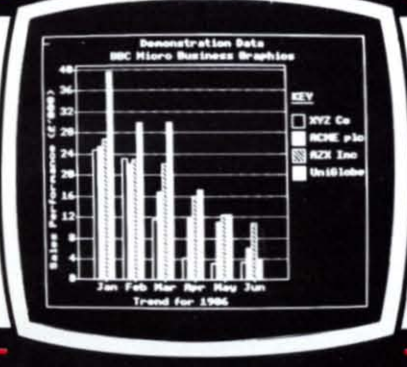

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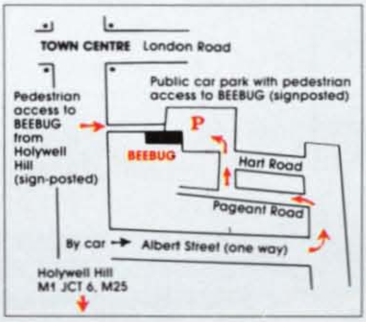
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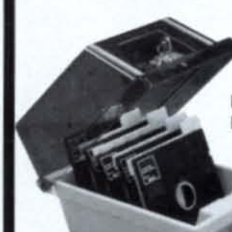

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Lift off lid

MD50

MM40

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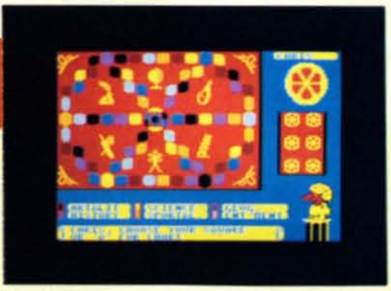
Question master?



Program: Trivial Pursuit
Price: £14.95 (cassette), £19.95 (disc)
Supplier: Domark, 204 Worple Road, London SW20 8PN.
Tel: 01-947 5624.

If you are part of the "in crowd" then you will have spent many an evening wracking your brains playing Trivial Pursuit, rather than getting tiddly down at the Dog and Duck. Now a computerised version has been released by Domark.

After loading, you are requested to enter the names of between one and six players. A comprehensive options menu allows you to alter several of the game's features. A timer can be used to limit the time taken by a player to answer a question, and you have the option of using a dwarf called TP as question master.

You may also load a new question file from this menu. There are eight such files containing over 3,000 questions in total, many of which are taken directly from the board game.

When the game commences a crude representation of the Trivial Pursuit board is displayed. Instead of rolling a die TP throws a dart at the numbers one to six and all possible moves are then highlighted on the board. You move your token to your chosen square and one of the six subject categories will be illuminated.

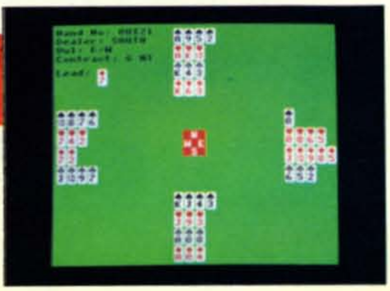
The scene now changes to TP's study where it's time to put your thinking cap on. Questions can be of three types: A straight forward written question as in the board game, a picture question for which a projection screen is lowered to display an image, or a musical question for which TP turns on his cassette player to play a tune. Answers are not typed into the computer but spoken out loud, and you press the fire button or spacebar to reveal the correct answer. You are then required to enter whether or not you got it right.

The BBC Micro version of Trivial Pursuit is embarrassingly inferior to its Amstrad and Commodore counterparts. Make sure you try it out for yourself before handing over any money.

Carol Barrow

Sound	*7*
Graphics	*6*
Playability	*7*
Value for money	*5*
Overall	*6*

Coming up trumps



Program: Bridge Mentor II
Price: £17.50 (disc), £19.50 (3½in disc for Compact)
Supplier: Minic Business Services, 12 Woburn Close, Bushey, Herts WD2 3XA
Tel: 01-950 9413

Bridge Mentor II is the third reincarnation of a program first released in 1984 and, as a confirmed player myself, I was a little wary of introducing it to several of my non-computer owning Bridge club friends.

The program comes up trumps, or perhaps I should say no-trumps in the case of Bridge, in the user-friendly stakes. Clear, easy to use menus guide you through the considerable number of keyboard entries necessary to set up a new game.

You can play out the existing archive of deals in the game library which comes with the program, but for true creativity and learning the facility to produce your own deal archives wins me over to Bridge Mentor II hands down.

Sixty deals are contained in the library and range from simple house rules conventions to the more complex conventions used in the Bridge-playing world.

Unlike several other games of its genre, Bridge Mentor II is the product of several programmers' minds – this is obvious by the several conventions used in different playing deals. Since every self-confessed Bridge expert is only "expert" in at best two playing conventions, the program will appeal to all types of player – from the beginner through to the professional.

Once a pre-programmed or self-programmed deal has been set up play commences with a nice on-screen graphical representation of the card table.

Since the program concentrates on hand analysis, each deal is not truly random since Bridge has defied the so-called logical analysis required for expert game systems.

Bridge Mentor II guides you through a series of logical menu choices, based upon an increasing amount of minimal information appearing, so that the ideal gameplay can be achieved.

In the event of a deviation from the programmed gameplay, the program does not simply browbeat you into accepting its play. Instead, a fresh sequence is created and, based on the human player's judgement, the fresh gameplay may be played right through.

If the playing of that deal turns out to be memorable, the option of saving the played-out deal to a new library archive is offered.

This is one of the best serious games programs I have yet come across. It can cope with many variations and, within the not-inconsiderable limitations imposed by the BBC Micro's memory constraints, proves more than a match for any serious Bridge player.

Steve Gold

Sound	*5*
Graphics	*9*
Playability	*10*
Value for money	*10*
Overall	*9*

Nasty newcomers

Program: Repton 3
Price: £9.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX
Tel: 0532 459453

JUST when you thought it was safe to go back down the mine, Superior Software has released Repton 3.

The game features all the characters and graphics from Repton 2, but is closer to the original Repton in gameplay and objectives. It comes with 24 individual levels to complete, stored on tape or disc as three separate files.

On successful completion of each level you are given the password for the next, which means that when you play the game on subsequent occasions you don't have to wade your way through it all again.

Repton 3 doesn't suffer from as much screen edge flicker as did Repton 2, and the animation is noticeably faster – our little green skinned buddy really tears around the screen under your control.

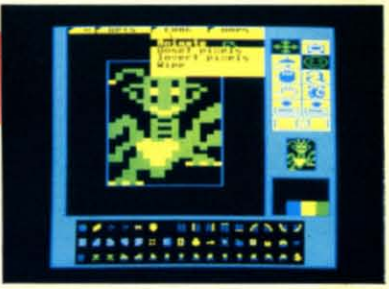
Only a small section of the overall map is visible at any one time. Each level is laid out like a maze, constructed from boulders, earth, diamonds, giant eggs and many other devilish things. To complete a level you must kill every monster and collect all of the diamonds and a golden crown before a time bomb explodes.

The problems begin as you burrow your way beneath the boulders. As soon as the supporting earth has been removed the boulder falls, killing you or changing the shape of the maze by blocking off a passageway.

For this reason your route through the maze must be very carefully planned – one badly placed rock and you might as well start again. As in Repton, you can call up a detailed map of the whole level to help you choose the correct path through a maze.

When I first played the game I thought the monsters were pretty tricky to deal with as they have to be lured beneath a precariously balanced boulder and then squashed.

One nasty newcomer to the Repton scene is the creeping fungus. As time passes this poisonous growth will spread around the maze. Your only hope is to block its way with a few well placed boulders.



Not only does Superior Software give you one of the best games of 1986 it also supplies a maze-editing utility. You can design your own fiendish mazes, save them to cassette or disc, and pass them on to your friends for them to solve.

I can say with complete confidence that Repton 3 will outsell every other game for the BBC Micro this Christmas.

James Riddell

Sound	*8*
Graphics	*9*
Playability	*10*
Value for money	*10*
Overall	*10*

Big and bright

Program: Thunderstruck
Price: £7.95
Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA
Tel: 0734 303663

WHILE doing your rounds as a cosmic dustbin man you are struck by a space/time thunder storm. As a result of this you find yourself trapped in an eerie medieval castle. All you want to do is get back to Myrtle and the kids before your dinner gets cold.

The multi-storey castle has eight floors which can be accessed in any order once you have located the castle's lift room. Using the cursor keys you can select a floor, then set the mechanism in motion and ascend or descend to a new level.

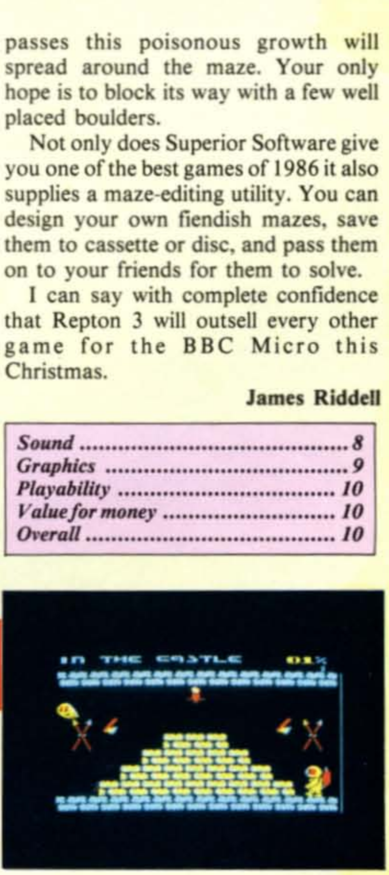
You will discover many objects, most of which have a specific function. If you are to escape from the castle you must use each object correctly, but due to the restraints of your bulky spacesuit you can only carry one object at a time.

One of the easier puzzles can be found the basement. When trying to access this level you find that the screen goes blank. Wishing to throw a little light on the problem you collect the candle which you saw on a higher level, but you are informed that it is not lit.

I spent a long time burning my fingers on the flaming torches trying to light the candle until I explored the other levels and found a suitable match. Returning to the basement I was greeted by a whole new floor.

One of the bigger puzzles involves lowering the drawbridge. On your travels you will see several large letters, and when you pick them up you are told that they operate the drawbridge. The letters D O and N are easily located, but I have yet to find a W to complete the sequence.

You have only one life, which you lose when your energy reserve is reduced to zero. This energy is lost through contact with flames and the castle's inhabitants, the most deadly being your own droids. They blame you for their incarceration and are fatal to the touch.



The game's graphics are big and brightly coloured, the puzzles varied in their levels of difficulty. Thunderstruck is a fun game and a good example of an arcade adventure.

Carol Barrow

Sound	*6*
Graphics	*8*
Playability	*8*
Value for money	*7*
Overall	*8*

Nasty newcomers

Program: Repton 3
Price: £9.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX
Tel: 0532 459453

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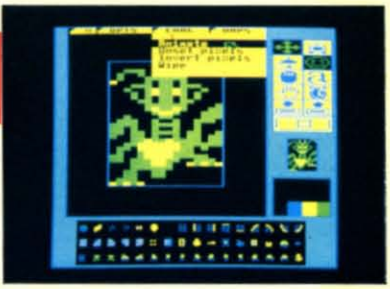

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Value for money	*10*
Overall	*10*

Big and bright

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Price: £7.95
Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA
Tel: 0734 303663

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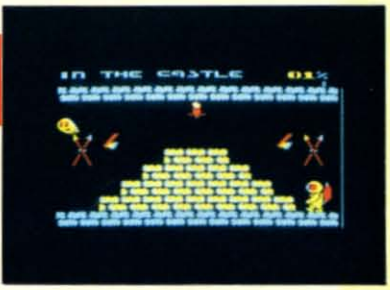
You have only one life, which you lose when your energy reserve is reduced to zero. This energy is lost through contact with flames and the castle's inhabitants, the most deadly being your own droids. They blame you for their incarceration and are fatal to the touch.



The game's graphics are big and brightly coloured, the puzzles varied in their levels of difficulty. Thunderstruck is a fun game and a good example of an arcade adventure.

Carol Barrow

Sound	*6*
Graphics	*8*
Playability	*8*
Value for money	*7*
Overall	*8*

Freedom of the press.

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COMPUTER COMPETITION P.4
P.10

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At long last you can produce newspapers, posters, leaflets, notices and handouts in your own school, home or office.

We're not talking about amateurish results, but extraordinarily professional work with crisp text and exciting graphics.

It's the sort of 21st Century technology that's turned Fleet Street upside down and is part of the most exciting advance in publishing since Guttenburg and Caxton.

You can type directly onto your screen with a choice of 16 typefaces or, if you really want to be creative, you can design your own typefaces, and, just like the most advanced computer setting, you can centre, range right, left or choose literal justification. You can even have full pixel control over character size and spacing.

Alternatively, you can load in 'wordwise' and 'view' files with fully automatic on-screen text formatting.

EXTRA! EXTRA!

Using the patterns supplied, you have outstanding graphics facilities for drawing, spraying and painting, or you can achieve some incredible results, using your own pattern designs.

The cut and paste options include copying, moving, rotating, stretching plus a fantastic zoom facility.

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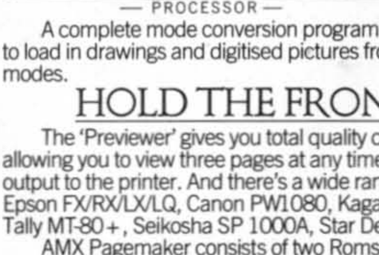
MAGAZINE MAKER INCLUDES AMX PAGEMAKER AND VIDEO DIGITISER WHICH IS OBTAINABLE FROM WATFORD ELECTRONICS · 0923 37774/40588.



TEXT FORMAT: Centre R.Right Literal Font
Amx Times
WEDNESDAY SEPTEMBER 11 1985
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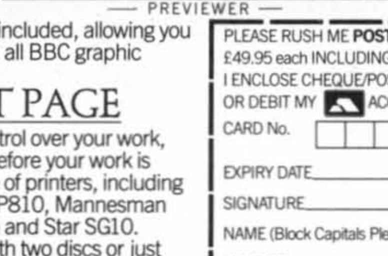
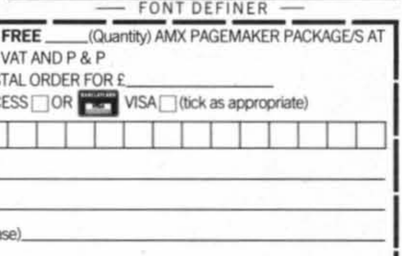


Use arrows to view Pages
SELECT
AMX TIMES
26th Sept 1985
DRIVE NUMBER:2
SYSTEM DIAGRAM
26th Sept 1985
DRIVE NUMBER:2
FUEL PUMP FIX
26th Sept 1985
DRIVE NUMBER:2

— PREVIEWER —



PAGEMAKER CHARACTER DEFINER
FONTNAME : Felt Tip
FILENAME : FELTTIP
DATE : 15th Oct 1985
EDITING CHARACTER NO : 65 - A
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{

— FONT DEFINER —

A complete mode conversion program is included, allowing you to load in drawings and digitised pictures from all BBC graphic modes.

HOLD THE FRONT PAGE

The 'Previewer' gives you total quality control over your work, allowing you to view three pages at any time before your work is output to the printer. And there's a wide range of printers, including Epson FX/RX/LX/LQ, Canon PW1080, Kaga KP810, Mannesman Tally MT-80+, Seikosha SP 1000A, Star Delta and Star SG10.

AMX Pagemaker consists of two Roms with two discs or just three discs on Master 128.

Coming complete with a comprehensive manual, AMX Pagemaker costs a mere £49.95 and is available from all good computer dealers or direct from the address below.

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SOLIDISK SUMMER SPECIAL OFFERS

£40.00 Cash Allowance for your old ROM Expansion Board when you trade in for the Fourmeg 256K

or £10.00 reduction if you already have Solidisk DFS

The memory limit on the BBC Micro can now definitely be a thing of the past. The new Solidisk Fourmeg 256 board offers all you could wish for.

It has 256K of extra RAM, a superfast 4MHz CMOS processor, sophisticated memory management, sockets for high capacity ROMs and 48K of software in ROM.

In fact, it contains even more devices than the BBC itself. It is compatible with most hardware add-ons — except Sideways ROM expansion, which explains why this special offer.

Fitting it is easy. You remove the existing processor from its socket and plug the new board in its place, push on three colour-coded wires, clip on two mini-hooks and it's ready. Switch on the computer and you will immediately see the difference.

The message "Solidisk 256K expansion (4MHz)" announces the new memory size and speed.

A switch at the back lets you select between the old (2MHz) and the new (4MHz) speed.

The BBC Micro at 4MHz easily surpasses the new MASTER 128K on benchmarks.

For example, it runs the benchmark using Basic 4 in only half the time taken on the MASTER 128K.

If you have too many ROMs to plug in at once, the Fourmeg 256 offers TWO ways out. First, it includes additional high capacity (and fast) ROM sockets. Moreover, two or four normal ROM images can be stored in one high capacity ROM chip (by "Vertical Paging") — so more can be made immediately available at your fingertips.

Secondly, ROM images can be stored on discs and loaded into any one of the eight Sideways RAM banks available.

If you need more room in "languages" such as VIEW or BASIC, you may use any of the eight SHADOW RAM banks. No user memory is then lost to the screen, whatever the screen mode (while machine coded programs can access RAM right up to &FC00!).

Two frequent uses of the extra memory are as a RAMDISK or a printer buffer.

Star commands in the ROM can turn the extra RAM into a silicon DISK of 200K, compatible with both the Solidisk DFS and ADFS formats. The RAMDISK is at least 10 times faster than physical disc drives as it has no moving parts.

The printer buffer saves you time, it lets you use the computer while feeding your printer in the background.

In addition, the MANAGER ROM offers over 30 star command utilities to save time and effort using the computer.

To complement such a powerful product, Solidisk has arranged with Computer Concepts to bundle the famous WORDWISE PLUS wordprocessor ROM and manuals. This excellent product, worth £45.00 on its own, became the best selling wordprocessor for the BBC computer last year.

All in all, the Solidisk Fourmeg 256 offers an unmatched combination of speed, power and built-in facilities, while still having room for even further expansion. It is the most logical next step for the owners of any Sideways ROM board or of Solidisk Sideways RAM, who can trade in their present boards for the excellent Fourmeg 256.

Yes! I want to take you up on your special summer offer

"I will pay only: (delete if not applicable)

☑ **£135.00 instead of the normal price (175), I will send you my old ROM board when I have been satisfied with your Fourmeg 256.**

☑ **£165.00 instead of the normal price, I already have your DFS installed in my BBC.**

☑ **I also allow £3.00 for First Class Post.**

If for any reason I am not entirely satisfied with your product, I will return it before 15 days and have all my money back (except postage if applicable)".

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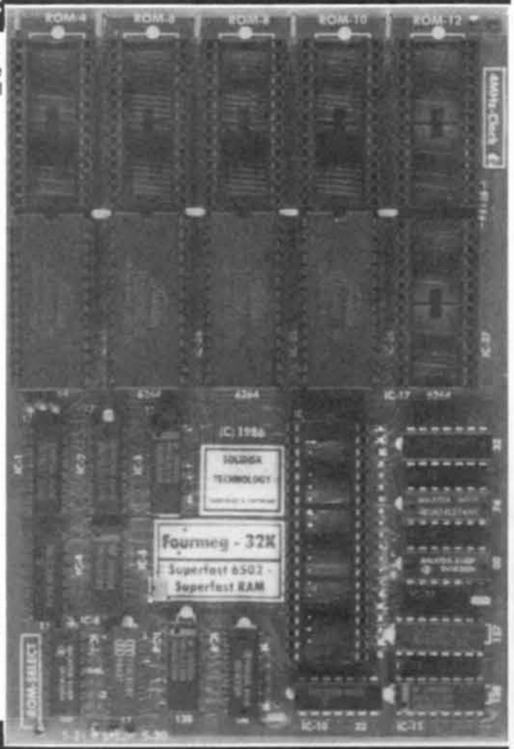
ASK FOR A BROCHURE

SOLIDISK NEW DEVELOPMENTS

Shadow, Sideways ROM and Sideways RAM All-In-One for £50:

This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).
The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.
The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.
The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.
When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).
The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.
The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

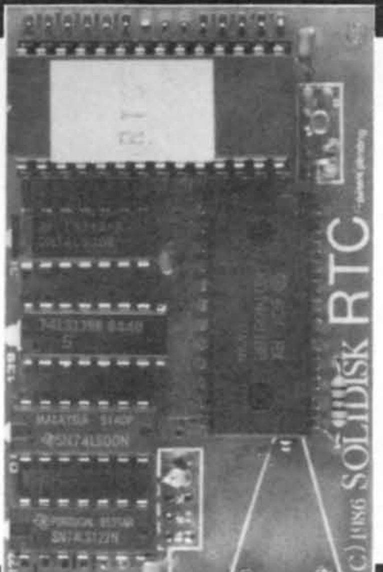
TWOMEG-32K	£50.00
65C02 (2MHz) for the above	£10.00
Or upgrade to FOURMEG	£25.00
FOURMEG-32K	£70.00



Real Time Clock & Desk:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.
The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.
You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).
The Real Time Clock will add fun and convenience to the every day use of your BEEB.

Order as CLOCK	£29.00



In Brief:

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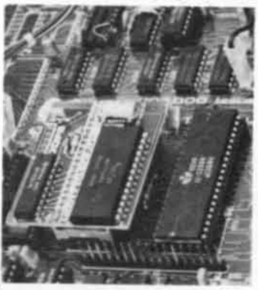
SOLIDISK BUDGET DISC SYSTEMS

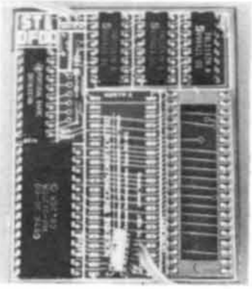
Double density disc interface



Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM .... £35.00 (order as XR/DDFS)

1770+8271, dual floppy disc controller interface

Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM .... £40.00 (order as XR/DFDC)

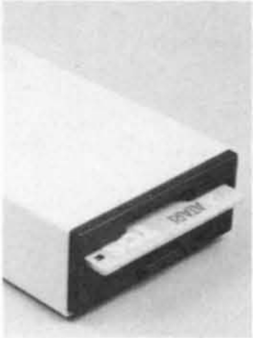


Low cost 3 ½ inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.

Order as 3.5 INCH-DRIVE (80 track/Double-sided) £90.00

FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.



Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.

Normally £30.00 but if order with DDFS or DFDC only £20.00

Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

DataLife
Verbatim

Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc... Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.

Normally £15.00 but if order with DDFS or DFDC only £10.00

Please mention computer model when ordering. Order as ROM2.2.

Unbeatable quality 5 and ¼ inch disc drives

Also available are NEC or MITSUBISHI 5 and ¼ inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only £109.00

Free bridge unit for twin drive systems

If you pay for two drives on a single order, we will offer you, absolutely FREE this practical BRIDGE unit. Solid steel construction, suitable for all Models of BBC and Master 128K.

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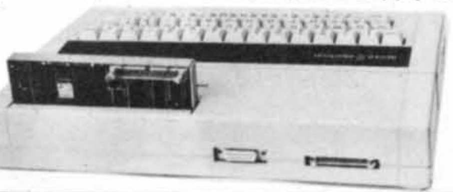
SOLIDISK AUTUMN SALE

Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only: .... £50.00.

Use a disc system with built-in power supply unit.



Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.

The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.

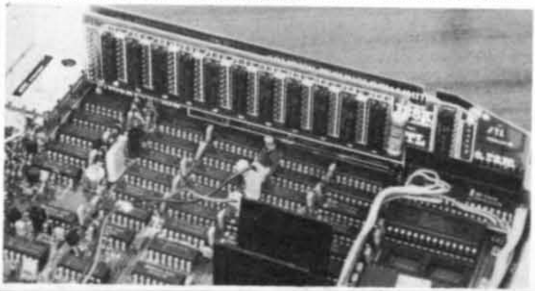
This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.

Order as SWR32 .... £20.00
Order as SWR128 (SWR32 with 96K extension) . £50.00

NB: Manual supplied but software (not strictly required) not included.

The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.

Order as VOL. XX £2.00
Order as SOFT/PACK 1 or 2 or 3 .... £10.00



Secondhand Refurbished Beebs:

As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure.

In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K . . . £50.00, FOURMEG-32K . . . £70.00, SWR64 with S/W pack 1 . . . £60.00, SWR128 (new style) with S/W pack 1 . . . £80.00, FOURMEG-256K with WORDWISE PLUS . . . £175.00, DDFS (1770) . . . £35.00, DFDC (1770+8271) . . . £40.00, DFS 2.2 ROM . . . £15.00, ADFS 2.1 ROM set . . . £30.00, 3½ inch (80 track double sided) drive . . . £90.00, 5¼ inch drive . . . £109.00, 20MB Winchester with PSU . . . £745.00, Linemaster communication ROM . . . £10.00, Insight intelligent disassembler ROM . . . £15.00, Solimon machine code monitor ROM . . . £10.00, Toolkit ROM . . . £10.00, S/W pack (1 to 3) of 5 discs . . . £10.00, 2764 EPROM . . . £1.00 each, 27128 . . . £3.00, 27256 . . . £6.00, EPROM programmer for 2764/27128 . . . £19.00, EPROM programmer for 27256 . . . £21.00, EPROM Eraser . . . £20.00.

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SOLIDISK SHOP IN ESSEX

System One: COMPACT

A Master COMPACT 128K, two 80-track, double-sided (1.3 MB) 3.5 inch disc drives (a must even for copying ADFS file to another disc), a choice of Mono or Colour monitor, free Solidisk Double Density DFS Master Version ROM to run thousands of BBC programs, free DATABASE and SPELLING CHECKER disc.

As illustrated with Acorn Mono monitor	£598.00
With Acorn Colour monitor	£749.00
MP165 printer if bought together	£220.00

System Three: MASTER 512K with 80186

A MASTER 128K internally upgraded with the 512K-80186 co-processor, twin 1.3 Megabyte disc drives, 20 MB Solidisk Hard Disc and special ADFS/Double Density DFS ROM, GEM and MASTER software packages.

As illustrated (without monitor)	£1600
With MP165 NLQ printer	£1800
With Juki 6100 Daisy Wheel printer	£1880

Pick any of these Four, and you are sure to get every penny's worth. You'll get more than just the lowest ever prices: a flexible trade-in scheme, free telephone support and free software are in the packs."

System Two: MASTER

A fully blown MASTER 128K, twin 80-track, double-sided 1.3 Megabyte Disc Drives in a bridge unit doubling as a monitor stand, free MEGAGAMES, DATABASE and SPELLING CHECKER in 5 discs.

As illustrated (without monitor)	£660.00
With MP 165 printer, 165 cps, NLQ, EPSON compatible (even the ribbon)	£880.00

System Four: 520 STM

ATARI slogan is 'Power without the Price'. This is specially true with this 520-STM computer, 16 bit 8MHz-68000 CPU and 512K of RAM, hard disc connector, RS232, Midi interface, printer port and Mouse. The bundled software includes GEM (as on the MASTER 512), word-processor, Basic, Logo and CPM emulator. More information is available on request. Two 80 track, double sided 3.5 inch drives (1.5 Megabytes) complete this system.

As illustrated (without monitor), you use your own TV set	£540.00
Special price for MP165 NLQ printer and lead	£240.00
Special low price on 20 MB ATARI ST Hard Disc	POA

The Powerstore

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

Printers

Code	Description	Price
P101	EPSON LX80 + 2 M printer lead	220.00
P101TF	LX80 Tractor Feed	21.30
P101SF	LX80 Cut Sheet Feeder	53.53
P102	EPSON FX85 NLQ + 2M printer lead	350.00
P102TF	FX85 Tractor Feed	30.59
P102SF	FX85 Cut Sheet Feeder	123.50
P103	MP165 — 165 cps + NLQ + 2M printer lead star buy*	260.00
P103R	Black ribbon for LX80, FX85 and MP165	4.60
P104	JUKI 6100 Daisy Wheel + 2 M printerlead star buy*	340.00
P104R	JUKI 6100 black vinyl printer ribbon	2.30
P105	Panasonic KX-P1080 + 2 M printer lead	165.00
P106	Kaga KP 810 + 2 M printer lead	240.00
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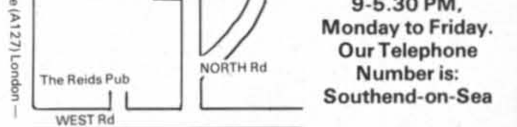

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EDUCATION
MICRO USER

New Masters in the classroom

Philip Andrews assesses the potential of the Compact

ONLY months after the BBC Master was launched, the new Master Compact has arrived, advertised as a machine suitable for home or school use. A review appeared in the October edition of *The Micro User* and the concensus was that it is a super machine.

The Master Compact has some advantages over the Master for use as a general educational computer. But I do believe that Acorn has produced another Electron – a design that is so nearly right but misses the mark by just enough to make the machine unacceptable for classroom use.

First let's look at the differences between the 128k Master and the Compact which could affect its use in school.

- It comes complete with single 80 track double-sided 3.5in disc drive. The discs for this are much more robust than their 5.25in floppy equivalents. Also they can store 640k of data whereas a standard 40 track DFS disc will only hold 100k. (A 5.25in 80 track disc can also store 640k in ADFS format.) The price – just over twice that of 5.25in discs – should reduce with popularity, especially now that IBM has gone over to this size for its desktop computers. A useful feature of the 3.5in disc is that it has a sliding plastic switch instead of the dreadful write-protect sticker. My only problem is that I can never remember which way the switch should be set. Why on earth can't this information be moulded in the plastic of the disc itself?
- The Compact only has the ADFS, although Acorn says that it will supply the standard DFS as an extra rom. The ADFS takes a little more understanding than a normal DFS system, especially when requiring data discs for a word processor or database. But the advantage of the ADFS is that far more files can be held on a disc and it will store over six times as much information as a normal 40 track BBC Micro disc.
- The printer socket is different but this is a nuisance rather than a serious problem, needing another cable.
- The keyboard has changed. It is now concave and of a membrane type, the feel being somewhat different although not unpleasant. The @ key is now above the 0, and a new function on this key enables extra symbols to be obtained more easily. This could be useful for special symbols and the characters required in modern languages.
- No user or analog port, Tube or 1MHz bus are fitted. These are seldom used in school, but the lack of a user port may cause problems because devices such as the Concept keyboard use it. There is an expansion port on the side of the Compact, and already add-ons are available for it.
- A new Atari-style joystick/mouse port has been fitted, giving PB0-PB4, CB1 and CB2, and +5 volt lines which are equivalent to part of the user port. The use of a mouse or other input device with this new port together with the WIMPs could reduce the usefulness of the Concept keyboard. For example, instead of using the Concept keyboard with a list of words the child can press, the mouse could be used to point to them on the screen. This would be much cheaper and allow much greater flexibility.
- There is no low voltage power socket, which means that devices such as a standard Jessop turtle requiring a power take off point will not work without modification.
- It should be possible to connect a standard

→

Poynders Gardens Estate ... the reality belies the name

Computer project is fighting crime

A BBC Micro is being used as the key weapon in the fight against juvenile crime on one of London's most notorious housing estates.

On the boundary of Brixton, the Poynders Gardens Estate has such a violent reputation that the police's shock troops – the Special Patrol Group – had to be called in to deal with the local villains.

Now the streets are becoming safer thanks to a computer project being run by the local Anglican church.

For Arthur McBryan, the community worker at St. Stephen's Parish Church, has persuaded some of the tough tearaways to get to grips with the BBC Micro.

Donated by a member of the parish, the machine is opening up new horizons for the youngsters.

And it is helping to solve a problem which is estimated to

→

affect close to 50 per cent of all the area's children – illiteracy.

A survey has shown that some 30 per cent are semi-literate and a further 20 per cent are totally unable to read and write. "We know of one whole family – a mother, father and four children – who fall into this category", said Arthur McBryan. "From this situation is born a real sense of frustration. And frustration in the case of youngsters can often lead to violence".

The community worker is well aware of how a locality can degenerate as a result of crime.

He spent some time looking after sick hippies in Afghanistan before returning to the UK to run a drug rehabilitation centre.

However the Poynders Gardens Estate was to prove an eye opener even for him.

Built shortly before the Second World War, it is now a nightmare maze of blocks of depressing flats.

Arthur McBryan points the way for a willing pupil

Racial tension has become rife in recent years as the percentage of black families has increased.

The police have made themselves unpopular by maintaining a high profile in order to stamp out drug taking.

Faced with it becoming a no-man's land, the church decided to act.

"The estate was deteriorating so rapidly that we had to do something fast", said McBryan. "And fortunately the BBC Micro has provided us with at least part of the answer".

Why has the machine had such an impact in the church project, when computers in the local schools have apparently failed?

"First of all the kids around here play truant so regularly that

From Page 31

5.25in disc drive into the disc socket of the Compact, although the connector is different to the Master's IDC socket. Usefully, both connections have the same function and are in the same order as the IDC socket, so it is possible to clamp a 25 way D-type connector on to a standard disc drive cable. It will then plug directly into a Compact and can still be used with other BBC Micros. A similar ruse can be used with the printer cable.

- There are no cartridge sockets on the Compact but this is no great loss because, at the time of writing, these cartridges have only just become available and have not yet really been exploited. On the Compact there are four spare rom sockets. This is about as many as you would really need, especially with all the sideways ram available, software for this being saved on disc and quickly loaded.
- The Compact comes with more educationally useful software than does the Master: Desk Top, Timpaint, Logotron Logo, View, ABC and a range of utilities and demonstrations. The desktop contains a clock, card index and calculator, all using WIMPs. There are also sprite and PWFS roms which I suspect are connected with the WIMPs. Once Acorn documents these roms they should become a familiar sight on the Compact.
- A useful feature is the built-in ADFS disc formatter. On the Master this is only available on the Welcome disc.
- The WIMPs supplied with the Compact will not work on the Master because of the organisation of the CMOS ram. This could cause compatibility problems for software designed for both.
- The Compact has less components than the Master and few of them are socketed so the computer should be very reliable. Shorting the power supply connector produces a nice clicking noise from the power supply, so it is clearly protected against such misuse. The one part which I am sure will cause reliability problems is the power socket on the circuit board. This type of socket is not noted for its robustness and can easily be damaged by misuse. These sockets have a maximum rating of 2 amps which the Compact keyboard unit is stated to use.
- The Master Compact is about £70 cheaper than a Master together with a 40 track disc drive.

These differences on balance favour the Master Compact, but the most critical problem for schools is the different disc format. The lack of a DFS and the change in disc size mean that schools would have to live with both formats together which would cause tremendous problems. To convert programs from a BBC Micro to the Compact they must first be converted to ADFS format and the easiest way to do this is with a Master. The disc formats can be converted using the Copyfiles utility on the Master Welcome disc if a hybrid twin disc drive is available. It should be possible to copy any unprotected disc and I suspect that most programs that will run on the Master will run quite happily on the Compact.

This is certainly not a job most schools will want to undertake as they would need a Master and a hybrid disc drive. Perhaps these are items that could be made available in teachers' centres, where the discs could be taken for conversion. But this becomes inconvenient if not impossible when you want to take data files and use them on either format. The only other solution, equally unacceptable, is for schools to buy software in both formats. I believe advising schools to buy the Master Compact instead of a Master will lead to many problems, unless the school is able to identify a use for it quite separate from any other computer activities undertaken.

Acorn believes it has a captive market in education, and up to now it had. LEAs have never had much support from Acorn in any direction so that more and more are beginning to wonder whether a change of machine is perhaps advisable.

I would suggest, for both education's and Acorn's sake, they start supporting those who have supported them so loyally for the last 5 years, and start to sell a different version of the Compact for schools with the following changes:

- Supply just the keyboard together with a Master or BBC Micro power supply packaged on its own. This would give the auxiliary power output to run a disc drive and so on. The keyboard contains the full computer with a mouse, printer and disc drive socket, so this would involve no redesign work by Acorn.
- Fit a DFS rom as well as an ADFS and supply the Compact software on a 5.25in ADFS disc.

I estimate that the price of this machine could be well under £300 to schools if some of the dealer discount is passed on to LEAs. This is then about £100 cheaper than a Master, and a complete system would cost under £500. Schools would be free to use whichever disc drive they wanted, 3.5in or 5.25in. Indeed with a switchable 80 track 5.25in disc drive you would have all the capabilities of the Compact's disc system.

Also, what happens when the existing BBC Micros reach the end of their useful life? Many schools may have just bought a disc drive or monitor and would expect either or both to outlive the computer. Thus replacement costs for a school could be spread out over the years instead of having a large single outlay.

With such a machine on the market I suspect that the low cost and the useful software supplied with it would greatly increase sales. Once sufficient machines have been sold I believe that writers will start designing software that makes the best use of some of the new features to be found on the Master and Compact. You would then have a machine which should satisfy the needs for a basic educational computer for several years to come, and continue to provide the stability in educational computing that is essential for the effective integration of computers into the classroom.

Christmas Crackers

These are just the kind of crackers any BBC Micro user would love to find in his Christmas stocking – packed with party games that make full use of the computer's power!

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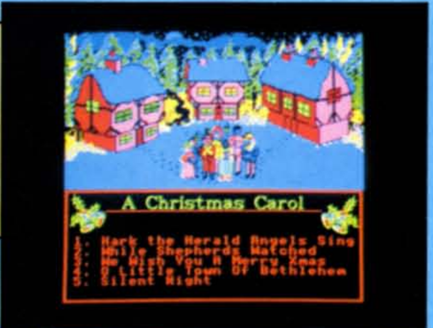
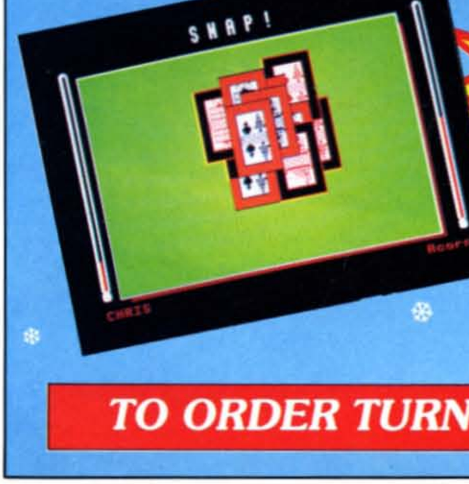


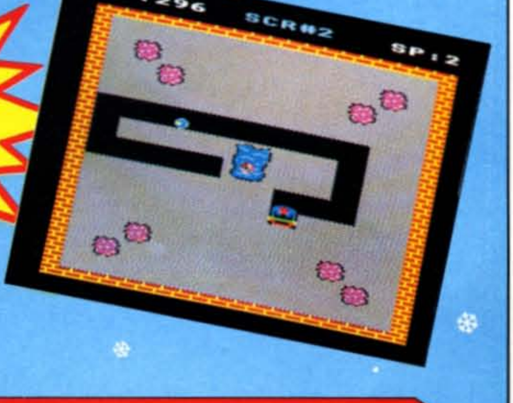
A Christmas Carol

1. Hark the Herald Angels Sing
2. While Shepherds Watched
3. We Wish You A Merry Xmas
4. O Little Town Of Bethlehem
5. Silent Night

BBC MICRO
ELECTRON



Put some sparkle into your Christmas!



TO ORDER TURN TO THE FORM ON PAGE 167

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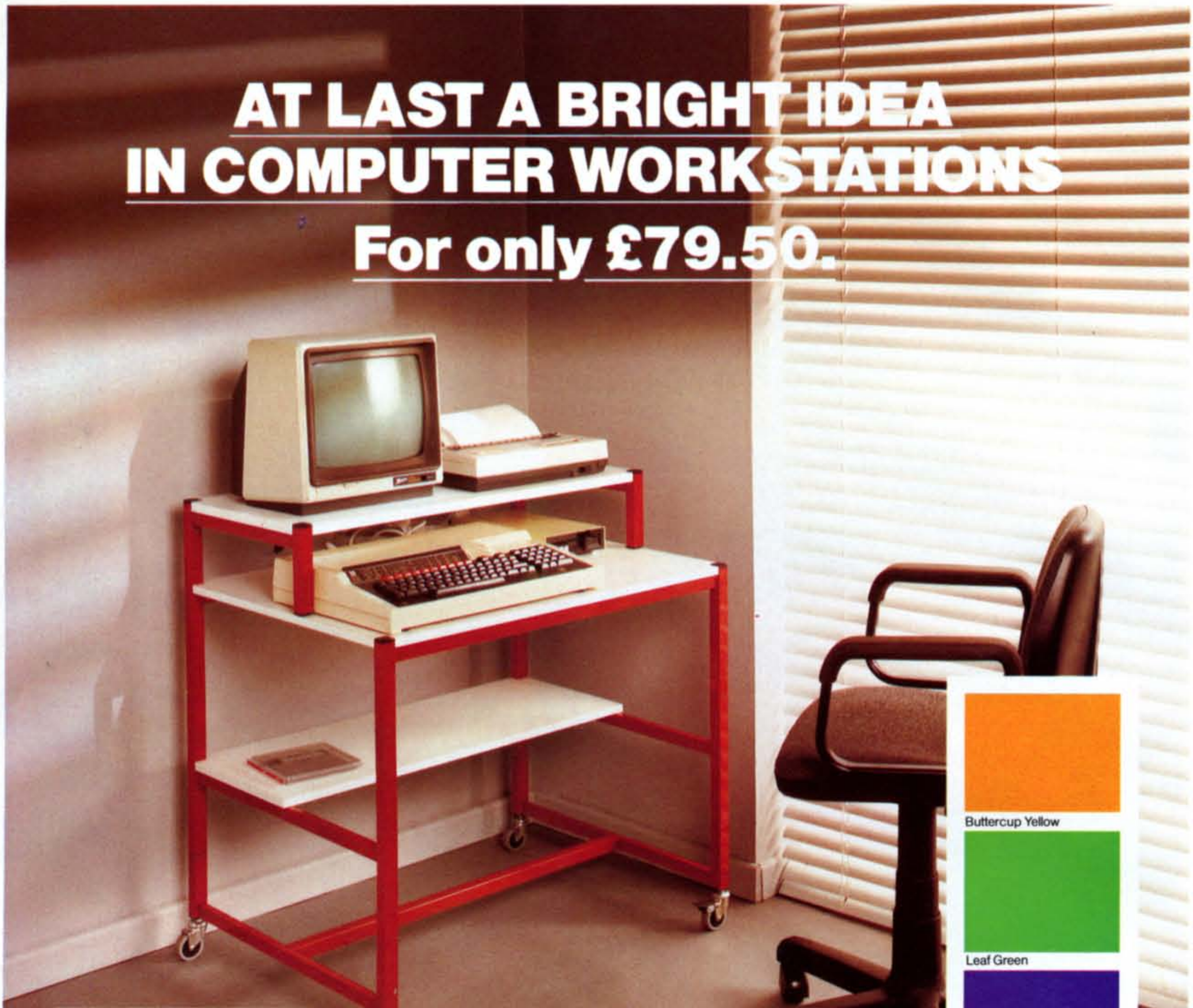

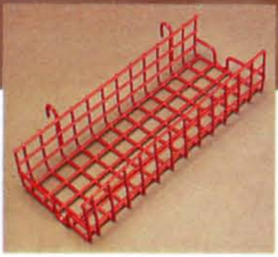

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The Klick colourframe workstation is designed to provide a highly efficient way of organising your micro system. This fully mobile unit runs on silent glide rubber tyred wheels and is ideal for use in the domestic or office environment.

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Marine Blue		
Mahogany Brown		

Klick

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they are unlikely to have come face to face with the classroom micro on a regular basis", claims the community worker.

"And we offer a friendly environment where many local teachers adopt the hard line tactics of clipping kids round the ear".

Though the church project has been considered a success to date – "The police tell us it is safer around here" – McBryan is concerned that lack of software will cause them to lose the initiative, for they are having to rely entirely on donations from sympathetic organisations.

"We can't get any help from the ILEA because they insist the club should be covered by insurance", says McBryan, and even if we could get it round here – which is doubtful – we couldn't afford it.

"So we are desperately in need of entertaining programs that offer basic inttroductions to reading and writing".

Companies or individuals who wish to help should contact Arthur McBryan at 252 Poynders Gardens, Clapham Park, London SW4 8PQ.

Toolbox on rom

SCHOOLS will welcome the Econet compatible rom versions of Toolbox 1 and 2. Offering the most useful routines from each, they will be released by BBC Enterprises early next year.

Routines include the symbolic disassembler, single step monitor, relocator, and Basic bad program fix.

The Basic utilities work across the Tube and the roms are compatible with all BBC Micros including the Master series.

The roms will cost about £12.95 each.

Assembler instruction on-line

BBC Telesoftware has announced a major new feature for BBC Micro users wishing to venture into assembly language and machine code programming.

Starting the second week in January, BBC Micro owners

Testing, testing, 1×2×3

By PETER DAVIDSON

HOW often have you been busy and your child or a pupil in your class has asked you to test him or her on some recently learnt topic?

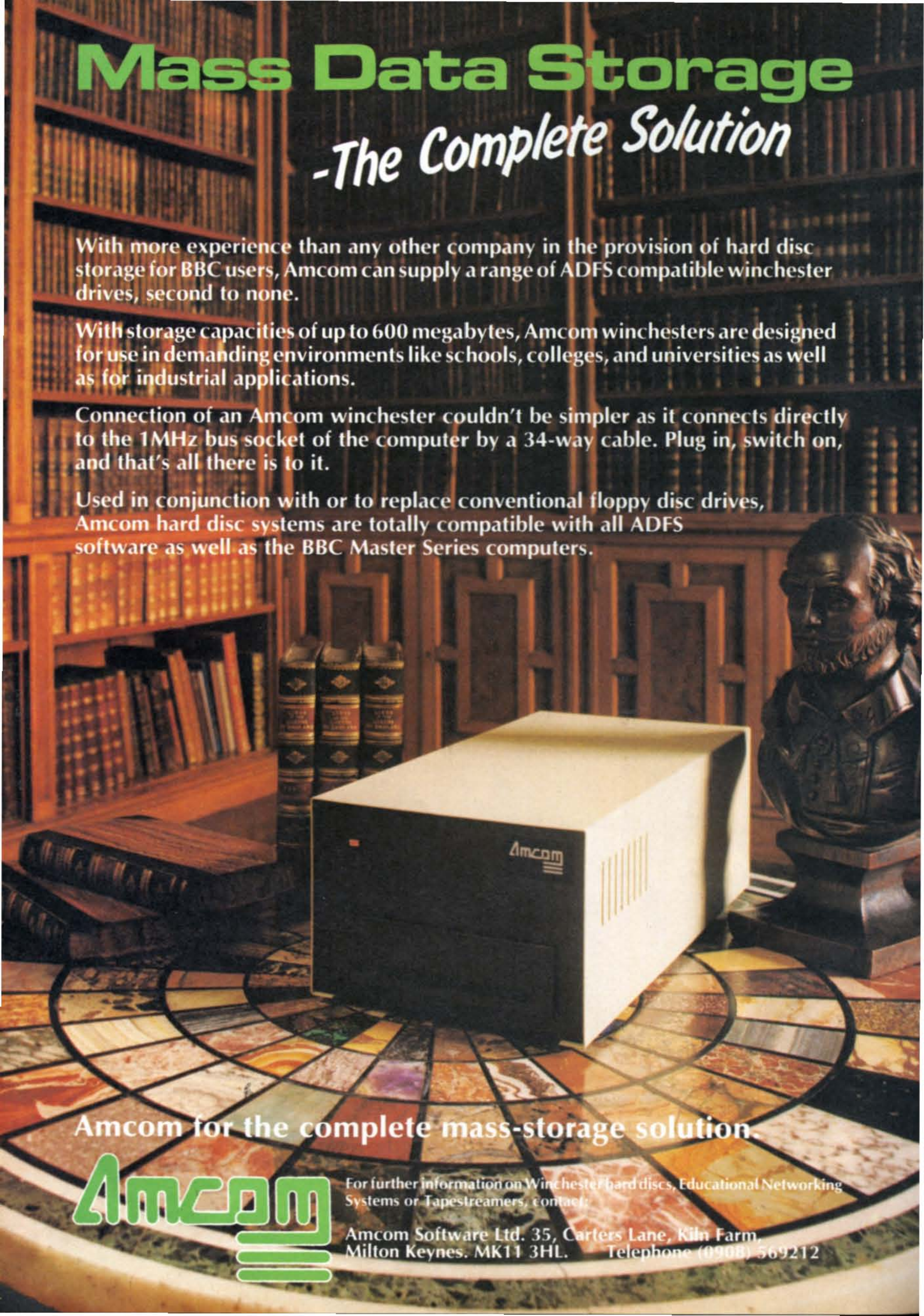
This program aims to test children on their tables, giving the time taken, to add a challenge to those who already know them and just want to become more proficient.

Before the test starts you will be asked whether you want the questions in numerical order or mixed up. By opting for questions in numerical order you can learn your tables by adding to the last answer, while random questions give you the chance to prove that the tables have been thoroughly learnt.

Each response is marked with a tick or cross and when the test has been completed you can have the correct answers printed alongside yours, allowing you to see where you went wrong.

Now just type in the program and see how well you know your tables.

```
   10 REM TABLES TEST
   20 REM By Peter Davidson
   30 REM (c) The Micro User
   40 ONERROR IF ERR=17 RUN ELSE MODE
 7:REPORT:PRINTERL:END
   50 DIMN(13)
   60 MODE7:PRINT:S=0
   70 PRINTSPC(10);:PROCprword("TABLE
 S TEST"):PRINT'''
   80 VDU28,0,24,39,3
   90 PROCprword("What is your name?
 "):PROCinput:PRINT''':name$=word$
  100 PROCprword("Hello "+name$):PRIN
 T'''
  110 PROCprword("Do you want your ta
 bles in order or"):PRINT'':PROCprword
 ("mixed up? PRESS O or M ")
  120 C$=GET$:IFC$<>"O"ANDC$<>"o"ANDC
 $<>"M"ANDC$<"m"THEN120
  130 PROCprword(C$)
  140 IFC$="M"ORC$="m" C=1 ELSE C=0
  150 PRINT''':PROCprword("Which tabl
 e (0 - 12)? "):PROCinput:table=VALwor
 d$:IFtable<0 OR table>12 THEN VDU11,1
 1,11,7:GOTO150
  160 CLS
  170 FORI=0TO12:N(I)=I:NEXT
  180 TIME=0
  190 FORquesloop=0 TO 12
  200 IFC=0 THEN ques=quesloop ELSE r
 nd=RND(13-quesloop)-1:ques=N(rnd):FOR
 I=rnd TO 11-quesloop:N(I)=N(I+1):NEXT
  210 PRINTTAB(3,1);:PROCprword(CHR$(
 RND(7)+128)+STR$(ques)+" X "+STR$(tab
 le)+" = "):PROCinput
  220 PRINTTAB(3,1);:PROCprword(STRIN
 G$(20," "))
  230 answer=VAL(word$):IFanswer=ques
 *table THEN S=S+1:M$=CHR$130+"/" ELSE
  M$=CHR$129+"x"+CHR$7
  240 PRINTTAB(24,ques+3)CHR$(RND(7)+
 128)STR$(ques)" X "STR$(table)" = "ST
 R$(answer)TAB(38,ques+3)M$
  250 NEXT
  260 PRINTTAB(0,17);:PROCprword(name
 $+", you got "+STR$(S)+" out of 13.")
  270 PRINTTAB(0,20);:PROCprword("You
  took "+STR$((TIME DIV 6000))+" minut
 es "+STR$((TIME DIV 100)MOD 60)+" sec
 onds.")
  280 PRINTTAB(0,8)CHR$134CHR$136"Pre
 ss Space for"CHR$137SPC5'CHR$134CHR$1
 36"another go."CHR$137SPC(5)''CHR$133
 CHR$136"Press C for correct"CHR$137'C
 HR$133CHR$136"answers."CHR$137:REPEAT
  reply=GET: UNTIL reply=32 OR (reply
 OR 32)=99
  290 IF(reply OR 32)=67 FORques=0 TO
  12:PRINTTAB(0,ques+3)SPC(5)CHR$(RND(
 7)+128)STR$(ques)" X "STR$(table)" =
 "STR$(ques*table)SPC(5):NEXT:PRINTTAB
 (2,1)CHR$133CHR$136"Press Space for a
 nother go."CHR$137:REPEAT reply=GET:
 UNTIL reply=32
  300 RUN
  310 DEFPROCinput
  320 word$=""
  330 REPEAT
  340 letter$=GET$
  350 word$=word$+letter$
  360 IFASCword$=13 word$="":letter$=
 "":GOTO390
  370 PROCprlet(letter$)
  380 IF ASCletter$=127 AND LEN(word$
 )>0 THEN word$=LEFT$(word$,(LEN(word$
 )-2))
  390 UNTILletter$=CHR$13
  400 word$=LEFT$(word$,(LEN(word$)-1))
  410 ENDPROC
  420 DEFPROCprlet(letter$)
  430 IFASCletter$=127 AND LEN(word$)
 >1 VDU8,32,8,10,32,8,11 ELSE IFASClet
 ter$<>127 PRINTletter$CHR$8CHR$10lett
 er$CHR$11;
  440 ENDPROC
  450 DEFPROCprword(word$)
  460 rnd=RND(6)+127
  470 PROCprlet(CHR$141):PROCprlet(CH
 R$rnd)
  480 FORI=1TOLEN(word$):PROCprlet(MI
 D$(word$,I,1)):NEXT
  490 ENDPROC
```



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With storage capacities of up to 600 megabytes, Amcom winchesters are designed for use in demanding environments like schools, colleges, and universities as well as for industrial applications.

Connection of an Amcom winchester couldn't be simpler as it connects directly to the 1MHz bus socket of the computer by a 34-way cable. Plug in, switch on, and that's all there is to it.

Used in conjunction with or to replace conventional floppy disc drives, Amcom hard disc systems are totally compatible with all ADFS software as well as the BBC Master Series computers.

Amcom for the complete mass-storage solution.

Amcom

For further information on Winchester hard discs, Educational Networking Systems or Tapestreamers, contact:

Amcom Software Ltd. 35, Carters Lane, Kiln Farm,
Milton Keynes. MK11 3HL. Telephone (0908) 569212

Canals program tends to spring a leak

Program: Canal Builder
Price: £12
Supplier: AVP Computing, Hocker Hill House, Chepstow, Gwent NP6 5ER.
Tel: 02912 5439

THE idea behind Canal Builder is excellent. You have to construct a canal between Xchester, a large industrial town, and Yboro, a market town, as profitably as possible.

To complicate matters there's an existing road network, a coal mine to service and a quarry that, once reached, supplies cheap building materials for the rest of your canal.

There's also a large hill between the two towns, shown in contours. You have to decide whether to tackle this via locks or tunnels, with varying costs.

To help defray this expenditure there's the traffic the canal carries between the towns, mines, quarries and a bordering farming area. The route you take is up to you, though you must bear in mind the economics of the situation. It comes to a trade-off, cost of construction versus revenue from traffic.

All in all, an intriguing simulation you may think, with lots of spin-offs for economic history and geography studies. However Canal Builder is flawed. For a start, it's restricted to only one case. Each time you run it you are presented with the same situation. There is no scope for pupils to apply the strategies they've learned to new situations. Arcade games can have multiple screens, so why not educational programs?

And there's a distinct lack of analysis of the results. I managed to get knighted after making a substantial profit, but was unsure as to how exactly I made it. The accompanying rather sparse teachers' notes don't illuminate much, either.

Another drawback is that the ideal solution seems to be programmed in. You can construct branch canals quite safely provided you're sticking to the obvious solutions. Creative deviation soon has the program worried, though. In fact the implementation of the program leaves a lot to be desired. You build your canal by steering it via the cursor keys, a far from friendly procedure. Rubber banding or use of the joystick would be far better.

In addition colours are used rather poorly. For instance, each contour is in a different colour, for no good reason. It would probably have been better to write the program in Mode 1 rather than Mode 2 as at present. The on-screen prompts would certainly have been far tidier that way.

Also construction of bridges and canal basins is a sloppy procedure. You can find yourself blocked from further progress for no reason other than, frankly, amateurish programming.

Canal Builder is a good idea, and could be used by skilled teachers as an initial stimulus to related work. However the realisation of the idea is rather limited, both educationally and practically.

Verdict: Could do better.

Michael Noels

INVALUABLE AID FOR SERVO SYSTEM USE

Program: Codas
Price: £190
Supplier: Golten and Verwer Partners, 33 Moseley Road, Cheadle Hulme, Cheshire SK8 5HJ
Tel: 061-485 8435

CODAS stands for Control System Design and Simulation and is not one, but a suite of programs for the simulation of servo systems. This package will deal with the single input/output systems most commonly found.

Conventionally the treatment of this subject is very heavily mathematical and consequently is considered a difficult topic. However, understanding its principles should be considerably easier with the aid of this package.

Unfortunately I cannot describe all the features of a control system in this review – I doubt that I could if they gave me the whole magazine. But for those of you who have not come across feedback control systems before let me give you a simple example.

Suppose you wanted to move a TV aerial with a motor to point at another station. To get some idea of where the aerial is pointing you would attach a potentiometer to the aerial shaft. Therefore the resistance would be proportional to position.

A simple control scheme might be to drive the motor at full speed until the desired direction is achieved and then turn it off. However, what would happen is that due to the momentum of the aerial it would

with a teletext adapter will be able to receive – free of charge – a series called Osbits which is designed to help people master the micro's built-in assembler.

The series of 26 parts aims to provide an introduction to machine code programming and the machine's operating system.

Each part will be accompanied by associated software, available for downloading at any time during the week of transmission.

Osbits goes beyond most course work by dealing with interrupts, events, vector interception, sideways roms and floating point arithmetic.

The series is intended to perform as a guide rather than a teacher in leading users through machine level programming.

Telesoftware is broadcast using the normal teletext service, and can be found on BBC2 Ceefax starting on page 700.

Language programs

NEW software from BBC Enterprises includes two language learning programs.

A Vous La France is a complete introductory package for French language learning.

No prior knowledge is assumed and the level achieved after using all the material is a workable conversational ability – about fourth-year O-level standard.

The software can be used in conjunction with the A Vous La France book and audio cassettes, with other French teaching materials or alone. Although designed for adults it is suitable for children from about 11 years of age.

The 45 programs in the package offer a variety of interesting ways to improve the user's French grammar and vocabulary.

Proven educational methods such as cloze testing (for missing words and letters), diagrams and sentence build-up are included, together with new approaches like street map reading with graphics, clock reading, a phrases fruit machine and even an adventure game.

The package runs on the BBC Micro, BBC B Plus, Master 128 and Electron. It is supplied on cassette, unprotected, with full instructions for transfer to disc.

When transferred the package occupies six 40-track discs. The software will also work on Econet. Price £19.95.

Deutsch Direkt! specialises in German vocabulary. It can be used with the Deutsch Direkt! course book and audio cassettes, other German teaching material or alone.

Suitable for adults and children from 12 years of age, the software consists of five activities, each of which can be used with any group of words in the disc dictionary provided.

There are two practice activities where the user works through the words, paying particular attention to capital letters, special characters and umlauts.

Three game-type exercises provide further stimulation to learn.

Included is a manual and an audio cassette containing pronunciations of every word in the dictionary.

The software comes on 5.25in 40/80 track disc and will work on the BBC Micro, BBC B Plus, Master 128 and Econet. Price £22.95.

From the same source comes Figures of Fun, a compilation of BBC Soft's educational packs for primary age children – Maths With A Story, 1 & 2 and Number Games.

There are 14 learning games on the 3.5in disc which comes with a manual and costs £19.95.

Electronic papers

ELECTRONIC publishing has become a major focus for the activities of Lincolnshire's microelectronics education development unit.

The central concept is that two "competing" papers are produced with real news in real time, and with a heavy reliance on electronic media.

The papers are staffed by equal numbers of pupils and teachers and served by a number of small "agencies" which are small scale simulations in their own right.

At the core is the news agency which draws its information from a variety of sources. Other agencies provide pictures and generate advertisements.

The latest MEDU newspaper project is using a remote news

From Page 37

overshoot and be pointing slightly too far round. The motor would then set off in the other direction in order to achieve the desired direction and would overshoot again and this constant oscillation would continue.

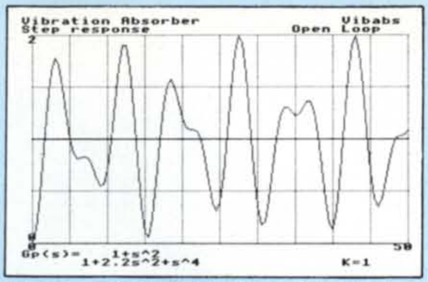
What is needed is some system that slows down the motor as the correct position is approached then there would be no oscillation and the system would work as rapidly as possible. You don't have to build a system like this to see how it will behave. You can model its behaviour precisely with mathematics, and this is known as a control or servo system.

A system is described by an overall gain constant and its transfer function. This is represented in complex number form as a polynomial or "pole/zero" pair. If some part of the output to the system is fed back into the input we say we have a closed loop system, otherwise we have an open loop system.

If we suddenly disturb the system it will respond in a certain way known as the transient response. There is also a response to constant signals known as the frequency response. It is also important that we know how stable a system is so that it will not break out into wild oscillations.

The package consists of several programs that share a common data file. A description of the system can be typed in using free form input and is easily edited. You can draw the transient response of the open or closed loop system. The root locus can be found using the branch following method and finally the frequency response can be plotted as a Niquist diagram or a Bode gain and phase plot.

It is possible to obtain a screen dump of all plots on an Epson printer. A useful feature for those who own some other make of printer is that the machine code program to do the dumping is held in a file which can be simply substituted by one of your own.



Response of a suspension system to a sudden shock

I must admit that my control theory was a little rusty as I hadn't touched any since I took my degree, but on using this package it all came flooding back. I was able to set up a system and look at the gain margin, step response and even the effects of adding compensators. The band width and transport delay were also easily gleaned.

It is very heartening to see the BBC Micro attracting this calibre of software. It was easy to use and did what you wanted. It is not a teaching package as such but an invaluable aid to anyone learning about or using servo control systems. Its price might rule it out for individuals to purchase but I would strongly advise that all those institutions involved in teaching control systems take a very close look at it.

You will not be disappointed.

Mike Cook

Stimulating simulation

Program: Raft Away River
Price: £19.95 (disc)
Supplier: John Wiley and Sons, Baffins Lane,
Chichester, West Sussex PO19 1UD
Tel: 0243 784531

RAFT-AWAY RIVER is an adventure simulation game for two to six players, designed to improve communication skills and encourage cooperative behaviour, careful planning and problem solving within a group. It also involves reading comprehension and the interpretation of pictorial information.

Initially the players are stranded on the west bank of a river in a remote wilderness area after a boating calamity. To reach safety they must build a raft. Unfortunately, there is insufficient timber on the west bank, so they must find some means of getting to the forest on the other river bank. They are constantly threatened by hunger, illness and floods.

Each player types in his name and is given two tools from the four available, a fishing line, rope, matches and an axe. For example, one may get matches and an axe while another gets a fishing line and rope. This obviously affects the work they can perform. They have a range of jobs in common, but one of them can light fires and chop wood while the other can fish for food and build a bridge or raft. These restrictions make cooperation essential if they are to succeed in their task.

The on-screen map is effective and colourful. Each child is represented by a stick figure which moves between the locations as instructed. Players are named in turn and told where they are and what they are carrying. They choose from 21 single key entry action commands which are set out clearly on the back of the student's guide. For example, pressing Q will print "Put wood from the pile on to the fire". If they are in the wrong place or have the wrong tools to carry out a chosen action the computer informs them of their mistake and they miss their go.

The guides set the scene and stimulate the imagination, though the operating instructions looked cluttered. Nevertheless this is excellent software that certainly achieves its aims and is ideal for a wide range of ages and abilities. Most eight-year-olds succeeded at the easy level in about an hour, but a group of adults found the very difficult level to be almost impossible. Thoroughly recommended.

Jim McHugh

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House
Magic Garden
Matchmaker
Numbers
Pelican
Seaside
Snap

Ages 5-8

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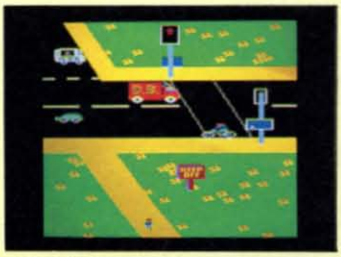
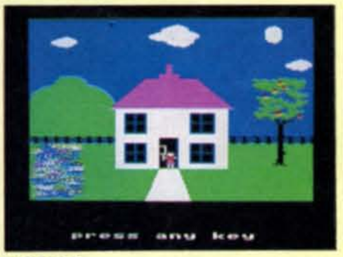
Castle
Derrick
Fred's Words
Hilo
Maths Test
Mouser
Number Signs
Seawall
Super Spell

Ages 8-12

Anagram
Codebreaker
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi

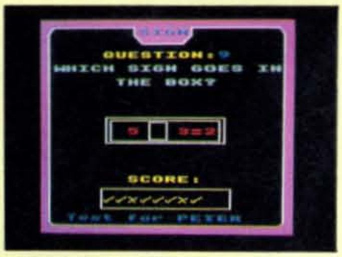


PELICAN
Teach your children to cross the road safely at a Pelican crossing



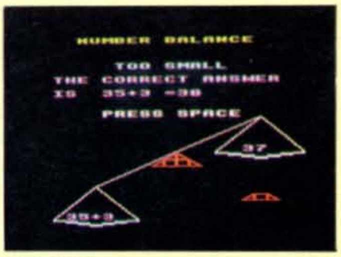
press any key

HOUSE
Select the colours to draw a house – hours of creative entertainment



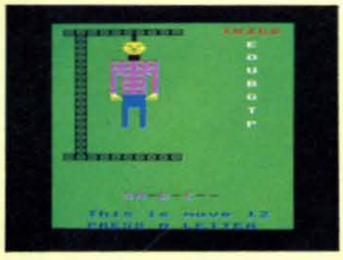
QUESTION:9
WHICH SIGN GOES IN
THE BOX?
5 ☐ 3=2
SCORE:
✓✓x✓✓✓✓x✓
Test for PETER

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten



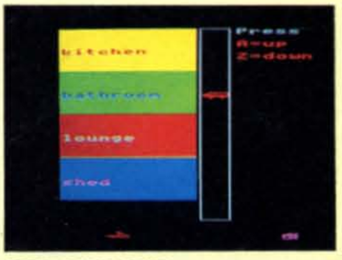
NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER
IS 35+3 =38
PRESS SPACE
37
35+3

BALANCE
Learn maths the fun way. Type in the answer to balance the scales



This is move 12
PRESS A LETTER

HANGMAN
Improve your child's spelling with this fun version of the popular game



kitchen
bathroom
lounge
shed
Press
A=up
Z=down

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 167

agency provided by TTNS from London.

This draws news from The Times computer, World Reporter and special correspondents in Australia, Austria and the USA.

Material is sent by electronic mail to the Lincoln "agency" and processed there by the two newspapers.

A "technology bus" sponsored by local firms is acting as a mobile public opinion agency, conducting polls in Lincoln on behalf of the newspapers.

Results of these vox populi exercises are relayed via modem to the "editorial offices" of the papers.

Linear Graphics has provided the project with a Plotmate plotter with scanner and some pages are being faxed and sent to London and Australia.

Curriculum development officer and simulation organiser Derek Maxted told *The Micro User:* "We are planning a joint simulation next March involving four schools in Gainsborough, with the bus as news agency and a repeat of the TTNS exercise.

"Also a joint simulation between several regional computer centres in the summer, and an intercontinental exercise later in the year".

Lincolnshire MEDU provides in-service training, back-up support and implementation of government funded initiatives for educational establishments in the county.

The technology bus provides mobile in-service facilities for information technology and control design and technology.

Apart from regular courses for teachers, MEDU is developing primary "host schools" – 15 local in-service training centres, each serving a small cluster of schools.

And it produces a county-wide educational computing magazine called Micro Lincs.

Classic releases

A NEW range of text adventures based on classic novels is to be released for the BBC Micro by Riverdale Software.

The first is a version of Charles Dickens' A Christmas Carol in which the player takes the part of Scrooge.

The second is another Dickens favourite Oliver Twist, and again the player takes the

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Pictures worth a thousand words

Mike Cannon looks at a promising new video digitiser

THE Watford Beeb Video Digitiser is another challenge to the creative computer user. It consists of a neat, lightweight grey plastic box measuring only 140 × 100 × 50mm.

The top face has two switches, one to select the graphics mode (the digitiser will only function in Modes 0, 1 or 2), and the other – an auto/manual switch – to adjust the black and white levels.

The unit has a connecting ribbon which fits into the user port. Unless you have a lot of peripherals drawing power from the computer you should not experience overloading problems. It is important that the plug is inserted the right way.

The video signal is fed through a BNC connector at the back of the digitiser and can come from a camera, videotape or television receiver. Clear connecting details are given in the accompanying leaflet and should cause no problems. The cable has to be bought separately and it is worthwhile spending extra to ensure that you get a good quality, well-shielded lead.

A normal sideways rom is also supplied, together with a slim operating manual which is adequate for most users. All the essential software is included on this rom and is accessed using star commands.

A useful one is *IMSAVE which saves the screen image to disc in compacted form, enabling you to store more pictures on one disc than would normally be possible. Remember though that you will need the digitiser rom installed to reload a screen saved in this way.

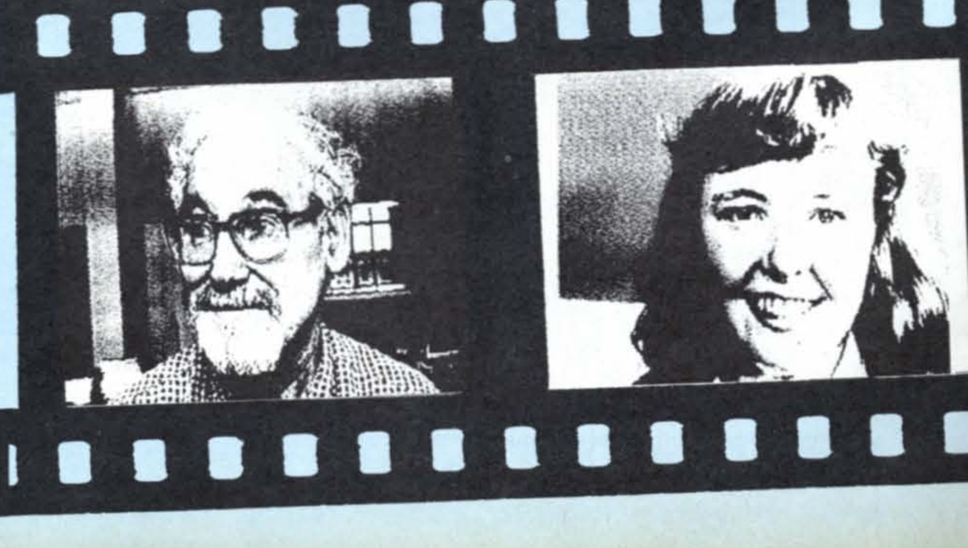
Other commands include ones to obtain the image from the digitiser, and to dump screens to various printers. A short Basic program is useful to tie these commands together, and examples are given in the manual.

Of course, once the display is on the screen it is held in memory and can be controlled using ordinary Basic commands quite independently of the rom software.

It is this flexibility of use which I feel makes the digitiser such a potentially powerful tool for creating graphics for self-produced magazines, newsletters or anything requiring a distinctive image. I wondered about the possibility of producing a personalised sports achievement certificate complete with a picture of the record-breaker.

At Levenshulme High School for girls, Manchester, the Watford Digitiser created a great deal of interest among staff and children. It was quite simple to use and producing a good image in poorish light conditions was achieved with ease when using our portable videocamera, the Panasonic A2.

We tried using a videotape as the input to the digitiser and the quality of the pictures



obtained was good despite the warnings in the manual. We obtained similar results using the video recorder's tuner on all channels.

Mode 0 seemed the easiest to control and predict the quality of the printout from the image on the screen. There was a little difficulty with the smaller image obtained on the printout compared with the picture size on the screen but in all cases the quality of the printout was better than that of the picture on-screen.

Just as important, recovering saved images at a later date was a simple independent operation.

As with many screen dumps, the physical operation of printing out the images produced with the digitiser is very wearing on the printer ribbon and excessive use may take the unit outside the normal budget of the ordinary classroom teacher.

Dumping images to the printer took considerably longer than would be acceptable if, for example, it was used during a normal 35 minute lesson.

Some school subjects might only have one teaching period per week so the whole impact of a lesson might be lost if the material was processed after the lesson and examined next time the class met.

The manual, which appeared to have been compiled by a technical writer, was alright for people who were familiar with computers and the language style of computer handbooks, but the kind of teacher who might want to use the digitiser would be unlikely to come from that background.

Watford needs to produce a much more detailed instruction booklet containing plenty of example programs and possibly a series of exercises to help the user familiarise himself with the equipment. Ideally these exercises should be available on tape or disc.

Examples of such use might include extra-curricular activities, perhaps connected with use of the video camera in art, processing diagrams and so on. It could also be used in school or class magazines or work sheets, or as an optional module of instruction within a wider course such as drama or information technology.

The advent of GCSE and the present intensive pressure on schools to adopt a modular approach to the curriculum give enterprising firms the opportunity to produce and present modules which use various items of their equipment with special emphasis on its vocational use.

The digitiser would form an ideal part of such a module involving exercises in the organisation and setting up of the equipment together with examples taken from a vocational background in which the equipment is used in real life.

The real versatility of the digitiser becomes apparent when it is teamed up with packages such as Mirrorsoft's Fleet Street Editor or AMX Pagemaker. More advanced micro users are recommended to examine the pack consisting of Pagemaker and digitiser which is very properly called Magazine Maker.

It is clear that an effort has been made to present the unit in a helpful way. However, the technically inept – though curious – teacher would soon become disinterested and the ordinary classroom teacher would not even attempt to unravel the mysteries.

I anticipate that these teachers could feel that in buying the digitiser the school had not got value for money. This would be sad because it is not the case.

The digitiser is an excellent product with wide appeal but it is let down by an inadequate manual. If Watford can rectify this it will have a product which would make an important contribution to any school resource room. ■

Product: Beeb Video Digitiser
Price: £110
Supplier: Watford Electronics, Jessa House, 250 Lower High Street, Watford
Tel: 0923 37774

part of the main character.

Because of the length of the adventures they will come in four parts on one tape.

Both titles cost £4 each.

Computer dictionary

CAMBRIDGE University Press and Acorn Computers have collaborated to publish Acorn Cambridge Illustrated Dictionary for Young Computer Users by Arthur Godman and Tim Tregear.

This up-to-date dictionary, which includes all the latest developments in technology, is easy to follow and suitable for use with all computers. It has simple explanations of computer jargon and, where possible, these are put into context. Many full colour illustrations are used throughout the book to aid understanding.

The dictionary also features a brief history of computers and a general description of the machines. There is a quick reference section explaining computer abbreviations, a Basic glossary and a table of the Ascii codes.

Hard covers: £5.95 net.

New language

A NEW computing language from High-level Algorithms called Halcien has been launched for the BBC range of micros.

Its features include a high level algorithmic format with modular program construction and efficient use of program memory space.

Halcien can automatically edit – under program control – a text file held in ram, supported by nearly 50 language keywords.

Programs have easy read and write access to textual data in the file.

It also includes an advanced graphics package allowing structured image drawing in both two and three dimensions.

Position, size and rotation of image components – icons – are controlled via a dedicated set of Halcien language keywords.

The package comprises a 16k eprom, user guide, function key strip and utility disc of demonstration programs and useful program components. Price £49.95.

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School admin on the BBC Micro

John Northwood reviews a package that takes the drudgery out of management

A COMPREHENSIVE school may contain over 1,500 pupils, more than 150 teachers and other staff and have a turnover approaching £100,000 per year. Any organisation of this size should clearly be able to benefit from using some form of computer-aided administration.

It is not surprising therefore that there has been no shortage of so-called school administration software in recent years. However much of what is on offer is either an adaptation of some commercial package which fails to take into account the special requirements of schools and often requires hardware generally not available in most or, if it runs on a school's existing hardware it seldom covers all the admin tasks.

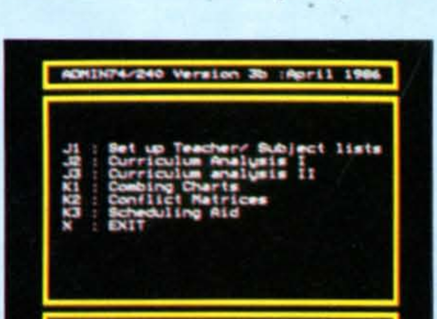
This results in the user ending up with a number of different packages to accommodate all the necessary jobs, many of which require the input of the same data.

This system, School Administration System for the BBC Micro, by Alan Dean is a well thought out integrated package for the BBC Micro written specifically for the small to medium secondary school. The author is a full time teacher of computer science with extensive school administration experience and this is reflected by the wide range of administrative tasks covered by the software.

The system requires a dual disc drive, and the 40 track version reviewed here comprises five discs, one of which contains some example data files to enable you to experiment with most parts of the package without first having to enter large amounts of data.

A version using 80 track double sided discs is available which virtually eliminates the need to swap discs when using different sections of the program.

The currently active files are held in memory which makes for faster use than accessing the backing store, but at the expense of data volume. The main limitations, and hence the restriction of the package's use to medium size schools, is a maximum of 74 teachers and 240 pupils per year group.



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ADMIN74/240 Version 3b :April 1986

J1 : Set up Teacher/ Subject lists
J2 : Curriculum Analysis I
J3 : Curriculum analysis II
K1 : Combing Charts
K2 : Conflict Matrices
K3 : Scheduling Aid
X  : EXIT

Select:
```

The main menu

These restrictions will be lifted when the package is rewritten for later machines such as the BBC+ and the Master.

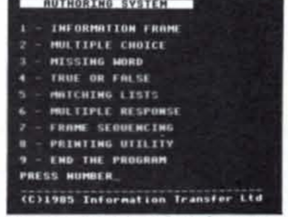
The full suite of programs may appear overwhelming to the first time user but everything is menu-controlled. Once into the system data input is easy and straightforward with good error detection as you establish the various parameters. Like most computer administration programs it relies on codes for subjects and teachers and many schools will find the allocation of two characters for these to be rather restrictive.

A major problem with many school admin programs is that they assume all schools to be the same and leave little freedom for individual preferences. This package clearly reflects the author's experience of the education system. He overcomes the major problem of just about every school having its own unique set of pupil data by splitting it into three areas.

The primary data includes pupils' names, sex and date of birth, while the secondary data includes six option subjects, examination entry or results data, and up to three user-defined items. Facilities in the additional pupil data entry allow for a further maximum of 40 data fields with a combined total of 256 bytes and up to 50 bytes on any one field. This should be ample freedom to meet the requirements of any school.

Characteristic of the thought that has gone into the package is the section for providing cover for absent staff. This is an area fraught with problems with virtually every school, applying different criteria for appointing non-teaching staff to cover lessons for absent colleagues with the consequent loss of their non-teaching time. The program considers six factors, and seventeen parameters apply weightings of various degrees to these factors, all of which you can modify to your own

→



```
InfoCAL
AUTHORING SYSTEM

1 - INFORMATION FRAME
2 - MULTIPLE CHOICE
3 - MISSING WORD
4 - TRUE OR FALSE
5 - MATCHING LISTS
6 - MULTIPLE RESPONSE
7 - FRAME SEQUENCING
8 - PRINTING UTILITY
9 - END THE PROGRAM
PRESS NUMBER_
--------------------------------------
(C)1985 Information Transfer Ltd
```

Main menu of the Info-Cal system

CAL package

A COMPUTER operated learning package that needs no programming is now available from communications consultancy Information Transfer.

Called Infro-Cal, it enables CAL programs to be written with the flexibility to create varied and interesting material, but without writing a single line of programming.

The authoring system, which loads itself, allows you to create six types of frame – information, multiple choice, missing word, true or false, matching lists and multiple response.

The originator chooses the kind of question to be included and types in the text as though using a word processor.

Info-Cal also has built-in formal testing, where the computer makes a random selection from a bank of questions each time the test is given.

The learner is then awarded a percentage score to enable the trainer to monitor performance.

Designed for use on the BBC Micro, B Plus and Master series, Info-Cal comes on disc with a comprehensive user guide. Price £240.

YTS running viewdata system

MIDDLESEX Training Centre has started its own public viewdata system.

Called HITeC, it is originated and maintained by YTS trainees and supervisors.

Subject matter ranges from local Hillingdon area information, through computer news to details about the Training Centre's activities. The Hilling-

→

don database includes a what's new feature, lists of local organisations and articles about the Borough.

There is a wide range of machine specific databases and a games review section.

As well as providing information, HITeC aims to entertain with joke pages, quizzes, "Did you know?" and gallery sections, some of which are contributed by users.

Interaction is one of the main features of the database. Most sections encourage response in the form of letters sent via the mailbox.

This is an electronic mail system which allows users to type in a page of text or graphics and send it to the HITeC host computer in Uxbridge.

The HITeC host runs on a BBC Micro, with twin 80 track double sided disc drives using CommuniTel software.

It is a Prestel look-alike viewdata system. Any terminal capable of accessing Prestel can log on to HITeC.

The system is on-line 24 hours a day, 365 days a year, on 089559842. Sysop is David Hook.

From Page 43

particular circumstances.

There are more than 50 output options covering just about every type of list ever required in a school. These include lists of forms, sets, options, grades, marks, examination entry, examination results analysis, staff cover and sports leagues lists. There are options for parents' evenings timetables, as well as room, staff and pupil timetables.

In addition the package provides for general purpose searches and production of fourth year option block fitting, D.E.S form 7 statistics production, curriculum analysis and a variety of other useful statistics that someone, sooner or later, will require in most schools. It even produces data files for use with Inform, the data retrieval package.

The only main school administration tasks not available are full school timetable construction and requisition type activities. Cheaper packages are available that provide some of these functions, but the main benefit and value of this integrated suite is that it all runs off the same set of data, thereby avoiding the errors and time in setting up new databases for each separate program.

The accompanying documentation is very good, consisting of a 164 page A5 spiral bound manual, but many users would find a larger format more useful. The easy-to-follow text is largely free from jargon and liberally illustrated with examples of typical printouts.

In addition to instructions on using the programs, the documentation includes useful information on backing up discs and the Data Protection Act. To the author's credit he provides an appendix that gives full details and parameters of the various files and discs for the computer buff in every school who will want to modify the system. However he also wisely advises that no support can be given when any system has been modified.

A computer administrative system should not require a detailed understanding of computers by the user. This package of programs is very user-friendly and was found to be particularly robust. It should be able to cope with the most perverse of operators, although non-computer minded admin staff may need some initial help in setting up printer parameters and in copying and backing up discs.

Although not cheap, at £120 this suite of programs represents very good value for money and once you became fully aware of its power, the package would quickly repay this cost in saved time.

Product: School Administration System
Price: £120 (40/80 track disc)
Supplier: A.J. Dean, 6 Birkland Drive, Edwinstowe, Notts NG21 9LU

EDUCATION SOFTWARE
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Shapes
Times table 1
Times table 2

BBC Disk £9.95, BBC Tape £6.95, Electron Tape £6.95

Mathematics 2 age 9 upwards
Addition 2
Subtraction 2
Multiplication 1
Division 1
Number Signs

BBC Disk £9.95, BBC Tape £6.95, Electron Tape £6.95

These programs have been developed with the aid of teachers and have been tested in Essex Schools and homes. The programs actually teach the concepts of Borrow, Carry & Payback.

NOT ANOTHER DEMONSTRATION PROGRAM!

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Epson LX86 .... POA
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Canon A55 .... £399.00
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Plus Full Range of Add-Ons, ROM software etc.
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Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

Text file recovery

ONE of my pupils accidentally pressed Break while using Wordwise. She then answered no to the prompt Old text? (Y/N) *thus losing a whole lesson's work.*

If this ever happens again, how can I recover the text? – **S.Collins, Manchester.**

● If this sort of problem occurs with a word processor there is a good chance that the text is still in memory so don't switch off. The text will be somewhere between PAGE and HIMEM, so save all the memory between these points. Recovery from tape is tricky, and we haven't room to cover it here, but if you are using a disc system use:

```
*SAVE TEXT 1900 7BFF
```

Now type the following, pressing Control + N before Return:

```
*DUMP TEXT
```

Press Shift until you recognise the start of your text as in this example:

```
01F8 00 00 00 00 00 00 00 00 ........
0200 00 81 53 74 61 72 74 0D ..Start.
0208 FF 54 68 69 73 20 69 73 .This is
0210 20 61 20 64 65 6D 6F 6E  a demon
0218 73 74 72 61 74 69 6F 6E stration
0220 20 66 69 6C 65 20 74 6F  file to
0228 20 73 68 6F 77 20 74 68  show th
0230 65 20 72 65 63 6F 76 65 e recove
0238 72 79 20 6F 66 20 77 6F ry of wo
0240 72 64 20 70 72 6F 63 65 rd proce
0248 73 73 6F 72 20 74 65 78 ssor tex
0250 74 20 73 74 69 6C 6C 20 t still
0258 69 6E 20 6D 65 6D 6F 72 in memor
0260 79 2E 0D 00 00 00 00 00 y.......
0268 00 00 00 00 00 00 00 00 ........
0270 00 00 00 00 00 00 00 00 ........
```

Make a note of the number XXXX on the left of that line (0208 in our example). Press Shift again until you recognise the end of your text and make a note of the number YYYY on the next line (0268 in the example).

Now press Control + Break and do the following, substituting your own numbers:

```
PRINT ~&1900 + &XXXX
```

and make a note of the result SSSS (1B08 in the example). Then enter:

```
PRINT ~&1900 + &YYYY
```

and note the result EEEE (1B68).

Now just:

```
*SAVE RECOVER SSSS EEEE
```

or in the example:

```
*SAVE RECOVER 1B08 1B68
```

You should now have the majority of your text back in a file called *RECOVER*.

There may be some corruption so you will have to edit it – but that should be easier than typing the whole file in.

If this method fails, you have the file *TEXT* containing your work, so do not destroy it. Unfortunately, in this case, recovery is more complex and would need a whole article to explain it.

Working party aids disabled

IN response to Mr March's letter in the September edition of The Micro User, *I felt that I should write something about the type of work myself and my colleagues have been carrying out for the past three years, with regard to our work with less able, visually handicapped pupils.*

I teach at Condover Hall School in Shropshire. Run by the RNIB, this is a school for pupils of secondary school age who are not only visually impaired but also have additional disabilities, including intellectual, physical, auditory and behaviour problems.

The introduction of the BBC Micro provided a challenge to myself and the rest of the staff in learning how to use it.

More importantly, there was a challenge in how to get the best from it in terms of pupil interaction, bearing in mind the diversity of problems experienced by our pupils.

Fortunately, I was invited to join a working party run by the Research Centre for the Education of the Visually Handicapped in Birmingham. The members were drawn from a variety of educational establishments, mainly concerned with the visually impaired, but also some from schools for pupils with severe learning difficulties, and schools for the physically handicapped.

The group meets once or twice a term at venues around the country in an attempt to review the latest developments and exchange ideas. From the collective experiences of the members of the group, everyone was able to gain much needed information with regard to their successes and failures in using a wide range of hardware and software.

We were also fortunate in having a programmer, Paul Blenkhorn, who was a Research Fellow at the RCEVH. His expertise proved to be invaluable in customising the software to the needs of our pupils.

The work carried out by the working party covers several areas. The first and most basic point concerned screen presentation. It was felt that there should ideally be a choice of foreground/background colours, but failing this, the background should always be black. Also, general screen presentation needs to be as clear and

French with fears

A PROGRAM which tests French comprehension and vocabulary against a background of life-or-death drama has been released by Database Software.

French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or those concerning things French.

It is meant for individual assessment, but can be used effectively for classroom work.

What makes it so different is that the user is cast in the role of an RAF pilot shot down over occupied France in 1943.

The only way to get back to Britain is to pose as a Frenchman, making use of information collected along the way while avoiding traps laid by the Gestapo and other enemies.

There are four escape routes and the language problems get harder with each one attempted.

Historically and geographically accurate, the program tests grammar, vocabulary and linguistic points and also the user's knowledge of France and the French way of life.

The standard of French required is generally about O level, but rises to just below A level in the final test.

Software releases

EDUCATIONAL software house Chalksoft has brought out six new titles for the BBC Micro, Master 128 and Compact.

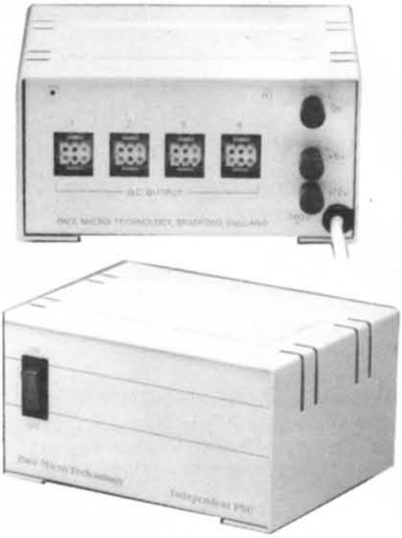
In Movaword five on-screen pictures are supplied – a house, a beach scene, a garden scene, and two "maths" pictures – and the aim of the activity is to move a word around the selected picture until its initial letter rests on the object it names.

After all the teacher-chosen words have been correctly positioned, the scene "comes alive". Price of £13 includes colouring sheets.

Numbers & Pictures provides structured work on number recognition, counting to, and counting back from 9, using BBC Micro sprite graphics. Price, including teacher guide and black-line photocopy colouring pictures, is £13.

First Filer allows young

BBC INDEPENDENT POWER SUPPLY



We have designed this Independent Power Supply for those of you who use disc drives powered from the BBC power supply and are concerned that with the addition of Sideways ROM boards etc., the psu is being overloaded. The Pace independent power supply unit plugs directly into the mains and has four power output sockets of the type used on the BBC. This means that you can plug your unpowered disc drives, buggies etc., directly into this unit thus removing the strain from the BBC Power Supply.

Technically speaking, the Pace Independent PSU takes 240V AC mains and gives out regulated +5V & +12V DC (±2%) and OV power through 4 parallel sockets. These sockets are of the same type as provided at the Auxilliary power output socket of the BBC microcomputer. Push connectors are also provided for all three voltage levels.

The unit is capable of supplying two single disc drives or one dual disc drive plus one or two other devices, such as Eprom programmers, which draw less current. The maximum current available is approximately 1.5A @ +5V and 1.2A @ +12V.

£39 plus VAT

Available from good quality dealers throughout the country or direct from Pace.

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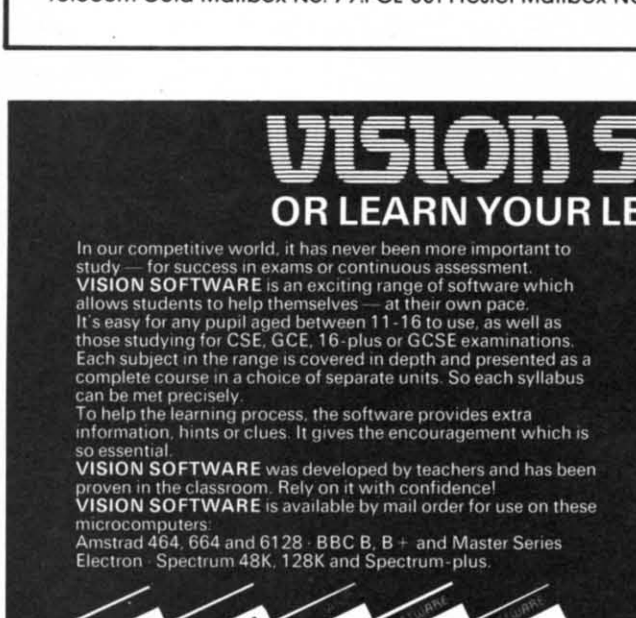
It's easy for any pupil aged between 11-16 to use, as well as those studying for CSE, GCE, 16-plus or GCSE examinations.
Each subject in the range is covered in depth and presented as a complete course in a choice of separate units. So each syllabus can be met precisely.
To help the learning process, the software provides extra information, hints or clues. It gives the encouragement which is so essential.
VISION SOFTWARE was developed by teachers and has been proven in the classroom. Rely on it with confidence!
VISION SOFTWARE is available by mail order for use on these microcomputers:
Amstrad 464, 664 and 6128 · BBC B, B + and Master Series
Electron · Spectrum 48K, 128K and Spectrum-plus.



Each pack contains a 3" or 5¼" disk or **TWO** cassettes, plus necessary study diagrams and a comprehensive user guide.

For a free catalogue: simply complete the coupon and send it to Disney Limited, FREEPOST, Sutton Coldfield, West Midlands B72 1BR. (No stamp required)

Please send my **FREE** catalogue of Vision Software and **FREE £3 value VOUCHER** for use with my first software purchase.

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Amstrad ☐ BBC ☐

Electron ☐ Spectrum 48K ☐

Subjects of interest and microcomputers are:

Chemistry ☐ Physics ☐
Biology ☐ Computer Science ☐
History ☐ Geography ☐
French ☐ German ☐
Information Processing ☐ Other ____________

____

____

Other ____________

MU 11/86

From Page 45

uncluttered as possible.

Another essential was the provision of some form of synthetic speech to provide prompts and/or reinforcement. Again ideally, this should be an option, enabling the teacher to switch it off or on as applicable.

Due to the type of user the group was dealing with, the type of synthetic speech initially decided upon was the Acorn Speech chip. Despite its obvious drawback of limited vocabulary, it was felt that this was more than offset by the quality of the speech, as compared to a text to speech system.

However, this theory has since been partly disproved, with the majority of the group's users appearing to quickly come to terms with the robotic voice of a text to speech synthesizer. Therefore most of the software has since been modified to operate from either the chip or a synthesizer.

Input devices were considered by the group so that the micro could be made available to as many of our users as possible. Because of the diversity of additional problems experienced by our users, mainly physical, motor control and coordination, the standard keyboard presented the majority with yet another handicap and somewhat restricted the micro's use and effectiveness.

The main solution to this problem was to utilise a variety of input devices, suited to the individual's needs and abilities. These include the Concept Keyboard, MicroMike, lightpen, Micrex Box (with a variety of appropriate switches), modified Perkins Brailler, and touch screen (both the Cheyne Scribbler and the Microvitec Touchtec 501).

The need for variety brought with it an additional problem in that most software is usually written to run by means of only one input device. It was therefore necessary to duplicate some of the modified materials to operate by some of these devices, and to stipulate the need for the option of device to be incorporated in any software being specifically written.

Certain group members and their establishments have also been involved in some additional development of specific aspects. For example Dave Mitchell (Alexander Patterson School) has helped in the development of a switch control box, aptly named BORIS (Box Of Really Interesting Switches!).

This is basically an enhanced Micrex Box, enabling four inputs and four outputs to be utilised. Dave has also done a tremendous amount of work in creating examples for the touch screen programs and the "Touch and Listen" discs produced by the RCEVH.

Condover Hall has been mainly involved in assisting in the modification of non-copyright software and additional examples for the touch screen programs.

A wide range of software is now available covering topics such as help for those users who are non-literate and have severe learning difficulties, reinforcment of the work being done by pre-braillists (both writing and reading), early visual perception training and pre-reading skills, pre and early number skills and typing and simple word processing skills.

Because of the difficulties experienced by teachers embarking into the field of using the micro with the less able and/or visually handicapped, the group is now attempting to produce information and guideline leaflets. The next stage, just being started, is for specific topics for discussion to be included in each meeting.

The outcome of these discussions will be the production of a paper on that topic which will then be available to anyone, through the RCEVH. Topics such as Controlling and Enhancing Sound Output, Communications, Mobility, Multi-Handicapped Users and Totally blind, non-literate users, have already been suggested.

If you have any more ideas please let us know. One major, on-going project similar to those mentioned above, which has come about from the working party, is the production of a visual assessment package.

The group as a whole, and Dave Mitchell in particular, has also been instrumental in the production of an information booklet which is available from the RCEVH at Selly Wick House, 59 Selly Wick Road, Edgbaston, Birmingham.

This booklet is intended for anyone just starting to use a BBC Micro with the less able and visually handicapped. It draws on the group's collective experiences and provides a basic outline of suggestions.

These are primarily aimed at hardware, software and peripheral equipment which group members have found to be most satisfactory. Also available are a termly newsletter, a comprehensive list of suppliers and a list of software developed at the RCEVH.

I hope this letter has been of some benefit to Mr. March and others alike.

The working party welcomes any new members or inquiries regarding the work they are doing. Should anyone require further details, they can obtain them from me. – **Chris Painter, Condover Hall School, Condover, Shrewsbury, Salop SY3 5HU.**

Machine code for knitters

I WAS interested to read the article on computer control by Philip Andrews on page 41 of the October issue of The Micro User.

In the article Philip mentions an unusual software package for knitters. My wife is a keen machine knitter and the software mentioned may well be useful in persuading her that computers can be useful.

Could you please let me have details of the supplier? – **F.J. Lovelady, Litherland, Liverpool.**

● We hope to publish a review of this software in a future issue. Details can be obtained from: Newsnight Ltd, Reliance House, 340 Clapham Road, London SW9. Tel: 01-627 3149

Catering for Any Questions

HOW do I get Any Questions, which was in the September issue of The Micro User, *to work on a Master? Pressing D for disc filing results in an error message. Does this also mean it will not work on a 1770 DFS upgrade?*

Are you interested in a file of questions and answers on catering? – **I. R. Sykes, Birmingham.**

● Any Questions works on a 1770 DFS. The problem on the Master is caused by *D. commands in lines 1390 and 1470. *DISC was not used because some disc filing systems report an error with *DISC (they need *DISK).

The only change you need to make for Any Questions to work on a Master is to alter the following lines:

```
1390 *DISC
1470 *DISC
```

We are interested in questions on most subjects and at all levels.

children to create and use small databases with the minimum of help, and can even be a valuable aid for the small school which wants to computerise its record-keeping systems. Price £17.35.

Transform is a mathematics program designed to simplify the investigation of transformations and coordinate geometry from upper junior to sixth form work and beyond.

Transformations of shapes defined by coordinates are instantly displayed on screen and can be retransformed at will.

Mistakes are easily rectified and images may be saved in calculator-like memories. Price £17.35.

Keyboard Player is a complete computer assisted learning course designed to introduce the absolute beginner to electronic – piano/organ – keyboards.

The computer introduces the keyboard with the help of a game called Sequences then teaches correct use of your hands.

The user learns to play a graded sequence of exercises and melodies along with the computer.

Additional exercises and melodies are provided – some in printed form – and advice is given on future progress. Price £17.35.

Arthur – The Legend is the title of Chalksoft's first multimedia topic pack.

It features a disc-based graphics adventure involving the search for the Holy Grail, stories on two audio tapes, slides, detailed teacher background booklet, open-ended work booklets for children, and many research and topic ideas. Price £29.95.

Upbeat drum

AN improved version of its drum machine add-on for the BBC Micro has been released by Rice Computers.

The software now allows 32 steps in a bar and tempo in the range 1 to 255. And it has been made compatible with the Master series.

People who already own an 8 bit D/A converter, or a sampler with an 8 bit D/A converter, can buy the program separately.

Software costs £19.95 on cassette, £22.95 on disc. BBC Micro and Master versions with the drum unit cost £45 on cassette, £47.50 on disc.

Two things your f

Good old Teddy will always have great sentimental value.

The BBC Master Compact, on the other hand, will be valued for more practical reasons. No doubt your child is already familiar with BBC micros from the classroom.

With the BBC Master Compact at home, they will soon feel completely comfortable using computers.

From then on, learning becomes that much easier.

Parents will quickly spot the value of this new BBC micro for themselves.

Once your child is safely tucked up with Ted, you might use the Master Compact to do the dreaded VAT returns.

Accountancy Age has already acclaimed our micro's spreadsheet package* as 'the most sophisticated yet produced for a small micro.'

The BBC Master Compact comes as a complete, easy to use package. This includes colour monitor, processor, disc drive and enough software to keep you and your children occupied indefinitely.

Have a chat with your local dealer or specialist retailer about the computer that equips your child for life.

Like a Teddy Bear, it can be justified as an essential purchase.

THE MASTER COMPACT 128K RAM, 3.5" DISC DRIVE, PRINTER AND JOYSTICK INTERFACE. SOFTWARE INCLUDES VIEW WORD-PROCESSOR, ABC, CARD INDEX, LOGOTRON LOGO, WINDOW DRIVEN DESK TOP SYSTEM, ADVANCED DISC FILING SYSTEM, 14 PROGRAM WELCOME PACK AND 4 TUTORIALS. *SPREADSHEET EXTRA AT £52. BASIC PRICE £399. WITH MONOCHROME MONITOR £469. WITH HIGH RESOLUTION (0.42 PITCH) COLOUR MONITOR (AS ABOVE) £599. ALL PRICES PLUS VAT. FULL DETAILS FROM BOB COATES, DEPT (MU3), ACORN COMPUTERS LTD., CAMBRIDGE TECHNOPARK, 645 NEWMARKET ROAD, CAMBRIDGE CB5 8PD.

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The BBC Master Compac

ve year old will still value at twenty-one.

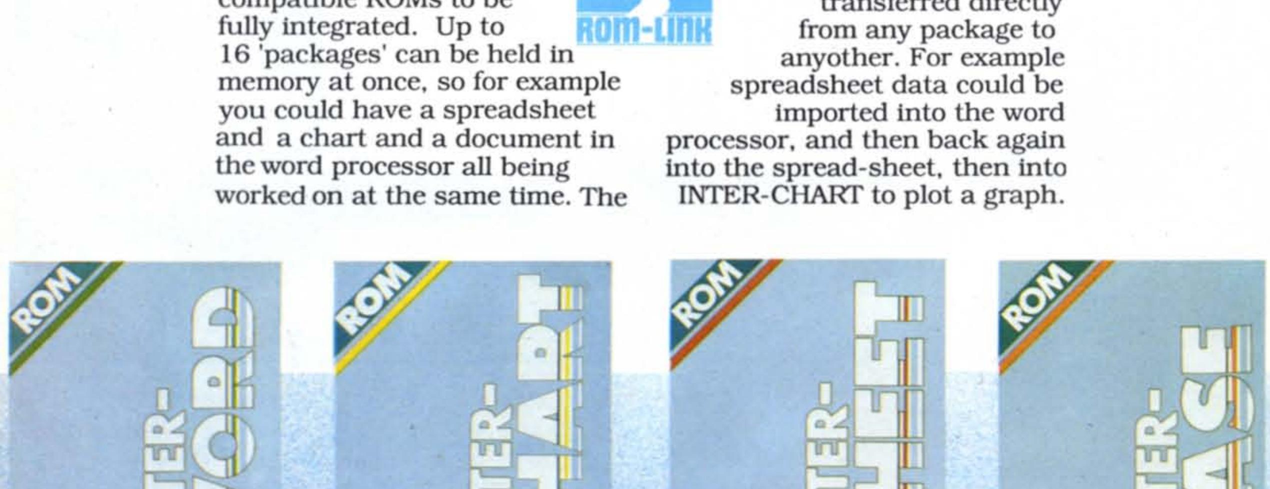
Equips your child for life.

Acorn

The choice of experience.

The only truly integrated suite of ROMs

This unique system allows all ROM-LINK compatible ROMs to be fully integrated. Up to 16 'packages' can be held in memory at once, so for example you could have a spreadsheet and a chart and a document in the word processor all being worked on at the same time. The ROM-LINK system also allows any data to be transferred directly from any package to anyother. For example spreadsheet data could be imported into the word processor, and then back again into the spread-sheet, then into INTER-CHART to plot a graph.


ROM
INTER-WORD
The integrated word processor for the BBC Microcomputer
Computer Concepts
ROM
INTER-CHART
The chart and graph plotting program for the BBC Microcomputer
Computer Concepts
ROM
INTER-SHEET
The spreadsheet program for the BBC Microcomputer
Computer Concepts
ROM
INTER-BASE
The data management system for the BBC Microcomputer
Computer Concepts

* TO BE RELEASED SOON

FOR THE BBC MICRO

Computer Concepts

The Master Compact Compatible

INTER-WORD

The latest word processor from the same stable as WORDWISE and WORDWISE PLUS, the most successful programs ever written for the BBC Micro computer. With years of experience and feedback from users, the authors of INTER-WORD have ensured that it suits everyone's needs. A great deal of attention has been paid to ensuring that INTER-WORD is fast, efficient and above all simple to use. Being menu operated the newcomer does not need to remember strange key combinations or command names. The menus are not a burden to the experienced user since there are shortcuts to access many of the features.

REVIEWS

"the most significant program since WORDWISE." ... "INTER-WORD on the BBC Micro compares favourably with word processors costing five or ten times as much on the IBM PC and the like." ... "INTER-WORD is a real pleasure ... a truly worthy successor to WORDWISE"

Gordon Taylor A&B Computing

"Rulers can be used to manipulate text to your satisfaction. This is a joy to use."

"INTER-WORD is certainly an advance on most other word processor packages."

Popular Computing Weekly, July '86

Technically, too, the program is astounding ..."
"... quite stunning handling characteristics"

Viewfax Tubelink—August '86

"INTER-WORD is the most powerful and comprehensive word processor available for the Beeb today. It is more powerful and flexible than View and still retains much of the friendliness and ease of use of Wordwise. Inter-Word looks set to become the standard word processor for the BBC Micro."

Beebug, Aug/Sept '86

Some of its special features are:

•Automatic re-formatting
This enables the user to just type - no keys to press to re-format the paragraph after changes to the text or margins have been made; the margins on the rulers can simply be dragged, all text being instantly re-formatted to the new settings.

•Multiple documents in memory.
Most people do not work on one document at a time. INTER-WORD allows up to 16 documents to be stored in memory at once, and text to be transferred from one to another.

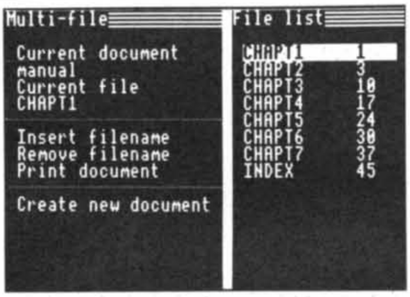
•Multi column
Built in facilities for printing text in up to 5 columns.

• Pull down menu operation
Simple and fast selection of all INTER-WORD options and page layout.

20% discount

Available to all WORDWISE PLUS owners. Simply quote you serial number, name and address when ordering direct. Discount price;
£39.20 + VAT (£45.08 incl.)

THE NEW WORDPROCESSOR FOR THE BBC MICRO



```
Multi-file                        File list
 Current document                 CHAPT1      1
 manual                           CHAPT2      3
 Current file                     CHAPT3     10
 CHAPT1                           CHAPT4     17
                                  CHAPT5     24
 Insert filename                  CHAPT6     30
 Remove filename                  CHAPT7     37
 Print document                   INDEX      45

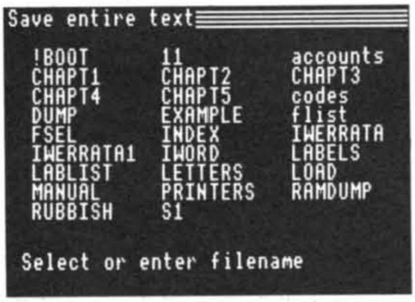
 Create new document
```

•Multi-file operation
Very large documents can be handled with ease. INTER-WORD's unique multi-file mode puts virtually no limits on document size and allows simple and fast movement to any point in the document.

•Block operations
These are common to most word processors, but with INTER-WORD any part of the text can be marked and then instantly moved, copied, deleted, printed, saved, underlined etc. There is no limit to the amount that can be marked.

•Specific page printing
Any page or range of pages may be printed, even in multi-file mode, with any number of copies.

•File selector
The file selector displays a list of all files - move to one and select it. You will never have to type or remember filenames again.



```
Save entire text
  !BOOT        11           accounts
  CHAPT1       CHAPT2       CHAPT3
  CHAPT4       CHAPT5       codes
  DUMP         EXAMPLE      flist
  FSEL         INDEX        IWERRATA
  IWERRATA1    IWORD        LABELS
  LABLIST      LETTERS      LOAD
  MANUAL       PRINTERS     RAMDUMP
  RUBBISH      S1

 Select or enter filename
```

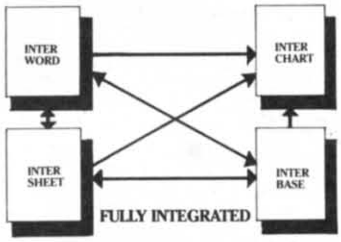
£49.00+vat(£56.35)

Computer Concepts

Gaddesden Place, Hemel Hempstead,
Herts. HP2 6EX, England.
Telephone (0442) 63933

•On screen style changes
Underline, bold and a special 'dotted' style are shown on screen exactly as they would appear on the final printout. Also left, centred and right justified text is shown on screen as you edit. What you see on screen is really what you get on the printout.

•On screen page breaks
You need never lose your place on the page. Top and bottom spaces, with any associated headings, footings or page numbers etc. are shown at all times. Like most features in INTER-WORD, a menu option lets you turn paging off.



•Integrated spelling checker
To be made available soon, this entirely ROM based spelling checker allows text to be checked as it is typed or after typing, at over 9000 words per minute.

•40,53,80 and 106 column screen modes
•Mail merge
•Integrates with all other parts of INTER family
•Automatic page numbering, with headers and footers
•Very fast and smooth scrolling
•Powerful search and replace facilities including wildcards, upper/lower case sensitivity, stored search and replace strings for instant re-use.
•Automatic word count
•Fast simple cursor movement to any point
•Easily tailored to any printer
•Line numbering
•Selectable screen colours
•Compatible with the B, B+ and Master; Solidisk, Aries and Watford shadow RAM boards.

Software is now more important than the hardware, especially with todays falling hardware prices.

INTER-WORD is the most sophisticated and professional word processing package available for the BBC Microcomputer.

MONEY-BACK
Guarantee
Buy INTER-WORD—if you don't like it—send it back for a full refund!
(Available when purchasing direct from Computer Concepts)

Watford Electronics

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
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All prices exclusive of VAT; subject to change without notice & available on request.

Credit Card Orders (ACCESS & VISA) Tel: (0923) 33383 or 50234 (24 Hours)

BBC MASTER 128K Micro	£395
BBC MASTER TURBO 4MHz	£493
512K Processor Add on Board	£335
Turbo 65C102 Add-on Module	£99
BBC MASTER ET (Econet Terminal)	£320
Econet Module for the Master	£43
ROM Cartridges for Master	£13
Reference Manual I	(No VAT) £15
Reference Manual II	(No VAT) £15
Advance Ref. Manual	(No VAT) £19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Upgrade Kit	£42
ECONET Upgrade Kit for BBC	£42

ALL ECONET UPGRADES Available

SPECIAL OFFER

FREE with every BBC Master purchased from us, Software Packages worth

£80

Comprising of: Computer Concepts New ***INTERWORD,*** *wordprocessor Rom,*
OFFICE MATE & OFFICE MASTER Softwares on Disc consisting of Database, Spreadsheet, Beebplot Graphics, Wordprocessor, Accounts Packs: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, Stock Control.

6502 Acorn 2nd Processor package	£172
Z80 Acorn 2nd Processor package	£319
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Cambridge Workstation	£3450
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Acorn Teletext Adaptor	£125
Acorn Prestel Receiver	£115
Acorn Bitstick I	£299
Robocom Bitstick II	£759
Upgrade for Bitstick I to II	£450
Bitstick Multiplotter Driver	£65

(Securicor carriage £7)

By popular demand our retail shop is now open until 8.00pm. every Thursday.

VARIOUS PRINTERS

● EPSON FX85 Printer	£315
● EPSON FX105 Printer	£435
● EPSON JX-80 Colour Printer	£420
● EPSON Hi-80 Printer Plotter	£319
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● EPSON LX86 Printer	£229
● BROTHER M1409 Printer	£285
● SEIKOSHA GP50A & GP50S	£49
● Centronics Printer Cable to interface all the above Printers to BBC	£6

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£27	RS232 + 2K Buffer	£55
IEEE 488	£65	RS232 + 8K Buffer	£75

COMPACT without monitor	£385
COMPACT with green monitor	£469
COMPACT with colour monitor	£599

INTRODUCTORY OFFER
As an introductory offer, we are offering the Computer Concept's INTERWORD ROM and Gemini's OFFICE MATE and OFFICE MASTER software packages (worth £80) ABSOLUTELY FREE with every COMPACT bought from us in November.

Securicor £7

WHY SHOULD I BUY A MASTER COMPACT?

Acorn Computers have sold over 1,000,000 computers to the home, education, business and research markets over the last six years, and so are a well established contender in the market.
Originating, and still very compatible with, the original BBC design from over 5 years ago, the Master Compact features many enhancements to the specifications of a Model B. The Operating System has doubled in size, the amount of memory installed has quadrupled, an advanced disc filing system is included as standard, and an even faster and more expanded version of the famous BBC Basic is installed.

Using a special 'front panel' program, you can configure the Compact to power up according to your requirements. The disc drives for the Compact are housed in a separate box, which contains the power supply and doubles as a monitor stand. Thanks to this box, the Compact normally only requires one mains socket.

RGB (colour) and composite video (monochrome) connections are provided as standard, along with a phono socket to permit external amplification of the 4 voice sound synthesis system. An 'Atari' style digital joystick port permits a wide range of joysticks to be used.

The Compact is supplied with a massive amount of bundled software, making it ideal for home, business and educational use. A single 3.5" disc drive is supplied as standard, with a second drive optionally available later. You can purchase the Compact with either a bundled colour or monochrome monitor, or choose from one of our popular range of colour and monochrome monitors. A UHF modulator will be available shortly for use with TVs. An Econet kit will soon be released, as will an RS232 kit.

There is already a lot of software available on 3.5" disc format (with much more to follow), but we can supply converted 5.25" disc drives, should these be required. A 50 way expansion bus guarantees future expansion.

Bundled software includes: Basic 4 (1986), View 3 (latest version), Printer drivers for View, Logotron Logo, ABC Word Processor, ADFS (latest version), Disc Utilities, Arcade style game, Adventure game, Range of tutorial programs, Desktop environment software, Notepad, calculator and clock for desktop, TimPaint drawing package, Card Index System, Character Definer.

Official ACORN Distributor

CENTRONICS GLP & Brother M1009 (NLQ) Printers

A major price break-through in NLQ Printers from Watford.

At last, a full feature NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP printer which is manufactured by BROTHER (and also marketed by them under their own brand name M1009), features a Near Letter Quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers). The NLQ Font Rom supplied is Watford's own Professional NLQ ROM for the GLP/M1009.

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Handles upto 9" wide paper. Friction feed standard, tractor feed optional extra.

GLP is bidirectional logic seeking. Has a 9 needle print head. 50 CPS. Parallel interface only.

Special Offer ***£95*** *(carr £5)*
Tractor Feed Attachment **£7**

Centronics GLP Mk2 (Brother M1109) NLQ Printer

100 CPS, (25 in NLQ mode), Bi-directional, logic seeking, Friction feed, tractor feed optional extra, 2K Buffer. Has both Centronics parallel and RS232 both as standard. Simply at the flick of a DIP switch, the Mk2 printer swaps between full IBM or Epson compatibility.

Launch Price: **£139** (carr. £5)
Tractor Feed Attachment **£5**

BROTHER HR-15XL

(NEW IMPROVED FAST HR-15XL)
The new improved Brother HR15XL is a very high quality and very fast daisy-wheel printer for serious use. Notable features of this printer include a 3k buffer, 20cps, bi-directional proportional spacing, Centronics interface standard, (RS232 optional).

ONLY **£295** (carr. £7)

TRACTOR FEED Attachment	£84

Ribbon Cartridges:
Fabric **£3;** Carbon **£3;** Multistrike **£5**

DAISYWHEELS (various typefaces)	£18

PRINTER SHARERS

(Ideal for School environment)

Connect 3 BBC Micros to 1 Printer	£60
Connect 6 BBC Micros to 1 Printer	£129

PRINTER CHANGER

Connects 3 Printers to 1 Micro	£65

(Cables extra)

HITACHI 672 PLOTTER

Only: £450 (Carr £6)

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £2.00
27128-250nS £2.40

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.00
2 × 6264LP (16K) £5.90

KAGA KP810
NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

Our Price: ONLY ***£215*** (£7 carr.)

Kaga RS232 Interface	£49
Kaga RS232 Interface + 2K Buffer	£69
Kaga RS232 Interface + 16K Buffer	£95

KAGA KP910 Printer

Similar to the KP810 but has 17" wide carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£375** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 meter Cable	£12

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
FX100	£7.00	£5.25
FX80/MX80/FX85	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
GP80	£4.50	£4.00
GP100/GP250	£5.95	£3.95
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
CANON PW1080	£5.25	£4.75
Panasonic KX1080	£7.75	£4.75
Microvitec Metal Monitors	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	£7
2,000 Sheets 9½" × 11" Fanfold Paper	£12
1,000 Sheets 15" × 11" Fanfold Paper	£9
Teleprinter Roll (Econo paper)	£4

Carriage on 1,000 Sheets £1.50

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000	90×36mm (Single Row)	£5.00
1,000	90×36mm (Twin Row)	£4.90
1,000	90×49mm (Twin Row)	£7.50
1,000	102×36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Acorn/Olivetti JP101 Spark Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only

£65

Pack of 4 refills **£10**

FREE Spark Dump ROM WORTH £15 for each JP101 purchased this month

JP101 Sparkjet Dump Rom £15

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

- 1431 – Medium resolution as used on the BBC television computer programme **£172**
- 1451 – High resolution, suitable for word processing in mode 0 .... **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£365**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£259**
- **TOUCHTEC** Touch Screen Pack **£250**
- Dust Cover for Microvitecs **£5.50**

KAGA/TAXAN 12"

- KAGA KX1201G Hi-res Green Monitor **£90**
- KAGA KX1202G Long persistance Hi-Res Green Monitor **£98**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£98**
- **KAGA Super Vision 3,** Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£320**

STAR BUY

- PHILIPS 14" Hi-Res, dark-glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £199

ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)

Green (New Design) Hi-res	**£69**
Amber (New Design) Hi-res	**£76**

LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. Carriage on Monitors **£7** (securicor)

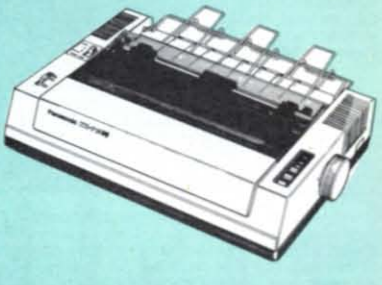
SWIVEL BASES
for Video Monitors

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£12** (carr. £2.50)
for 14" Monitors **£16** (carr. £2.50)

Panasonic KX-P1080

FREE BBC Micro Cable



From the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer

Available NOW at a superbly realistic price, the KX-P1080 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 100 cps of clear Draft text backs up the crisp 20 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

FREE with every KX-P1080 printer purchased this month, 1000 sheets of fanfold paper, printer cable for a BBC micro and our sophisticated Dump Out 3 screen dump ROM.

Introductory Price: **£155** (carr. £7)

NEW LAUNCH

A few months ago, we introduced the KX-P1080 to our large and discerning customer base. As a result of the enthusiastic and overwhelming reaction to this versatile dot matrix printer (see above for details), we are now extremely pleased to be able to bring you details of the fabulous KX-P313 Daisywheel Printer, also from Panasonic. The KX-P3131 printer is the ideal printer for the home user wishing to produce clear, immaculate letters or reports.

Ideally suited to the pocket of the home user, costing not much more than a pair of disc drives, this daisywheel printer delivers flawless text at 10, 12 or 15 characters per inch. It also supports proportional print mode.

Printing at a respectable 17 characters per second, the KX-P3131 features a capacious 6 kilobytes printer buffer to swallow most printing requirements with ease. For the more demanding user, there is a 32 kilobytes printer buffer option available. Taking paper up to 13.5" wide, the KX-P3131 prints with bidirectional logic seeking, ensuring the minumum time to print your text.

Continued →

MARK 2 LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions It only operates on high frequency light from the TV or Monitor.
The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Special Offer Price: £15

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

● *Complete Disc Interface Kit incl. DFS ROM & fitting instructions*	**£58**
● *Acorn's 0.90 DFS Kit complete*	**£52**
● *DFS Manual (Comprehensive)*	*(no VAT)* **£6.95**
(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)	
● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**
● *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**	

● *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

● *Complete DDFS Kit incl. fitting instructions*	**£46**
● *DDFS Manual*	*(no VAT)* **£6.95**
● *We will exchange your existing Single Density DFS Kit for our DDFS Unit at*	**£35**

CHRISTMAS GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5; £10 & £15 demominations and are an ideal answer when faced with that problem of what to give for that special Birthday/Christmas gift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

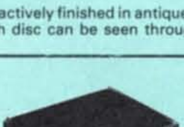
For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

DISC ALBUMS £4

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.



STAK-PAK

The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

Five twin Packs incl.
10 Cassettes Only: **£5**

FLOPPY HEAD CLEANER KIT

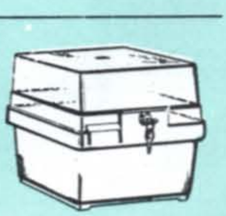
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

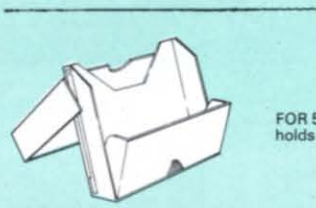
£8

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● M35 - holds upto 50 discs	**£8**
● M85 – holds upto 95 discs	**£11**





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20**	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

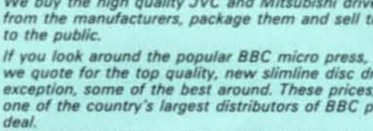
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

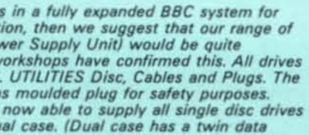
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. We are now able to supply all single disc drives in Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives; allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space; your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £99	
400K (720K)	CLS400S £97	CLD400 £165	CS 400S £110	CD400 £189
800K (1.44M)		CLD 800S £183		CD 800S £205

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £5 to £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	**£10**
● *10 × 5¼" D/S D/D 40 Track Diskettes*	**£12**
● *10 × 5¼" S/S D/D 80 Track Diskettes*	**£17**
● *10 × 5¼" D/S D/D 80 Track Diskettes*	**£17**
● *Hi-Density 1.6M D/S D/D for IBM*	**£32**
● *10 × 3½" S/S D/D 40/80 track Discs*	**£20**
● *10 × 3½" D/D D/D 40/80 track Discs*	**£27**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£9**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£11**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£15**

- **3"** *Double Sided Discs* **£4** *each*

Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	**S/S 80T**	**D/S 80T**
● Without Sleeves	**£49**	**£74**
● With Sleeves	**£50**	**£75**

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050;** 30 Megabytes **£1549**

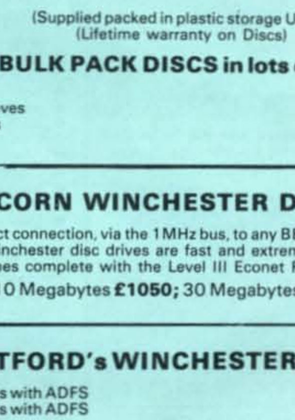
WATFORD's WINCHESTER DRIVES

● 20 Megabytes with ADFS	**£635**
● 40 Megabytes with ADFS	**£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

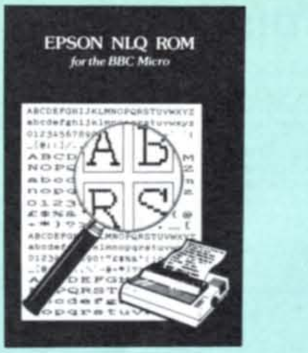
CDP 800S



CDPM 800S

Twin 800K Double sided 40/80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £235
CDPM 800S for Master £245
(Securicor Carr. £7)



Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00
(Hi-View compatible)

THE NLQ DESIGNER

(The First & still the Best)

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

A 40 or 80 track (please specify) FONT Disc containing 9 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

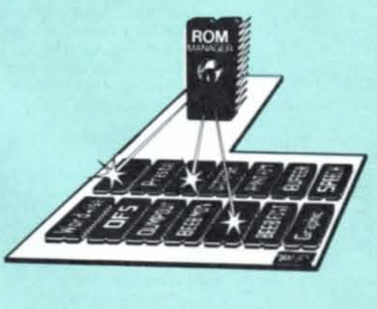
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



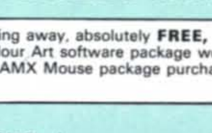
Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

We are giving away, absolutely **FREE,** our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX DESK Package	£19.00
AMX UTILITY Package	£11.00
AMX SUPERART Package	£42
AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse	£39
AMX 3D ZICON Disc	£20
AMX Database Disc	£20
AMX XAM Educational	£20
AMX MAX: A gem of desktop (ROM)	£17

RB2 MARCONI TRACKER BALL

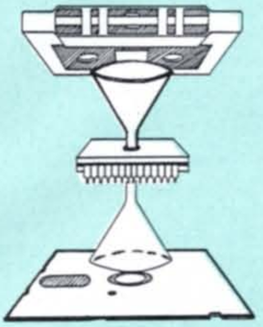
This popular unit is supplied complete with software. Price: **£50**

FLEET STREET EDITOR

Software pack **£35**

TRANSFEROM

(Tape to Disc Utility)



Not compatible with 1770 DFS.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

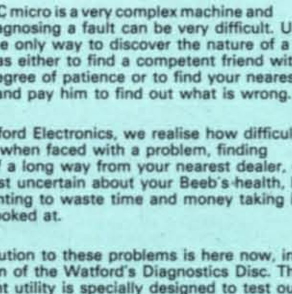
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

NEW LAUNCH

THE BBC PLUS ROM BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

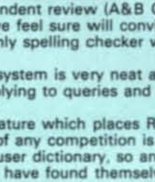
6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

ROM-SPELL

"way ahead of any competition"



ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

£25

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

BBC MICRO BUSINESS/ WORD-PROCESSING PACKAGE

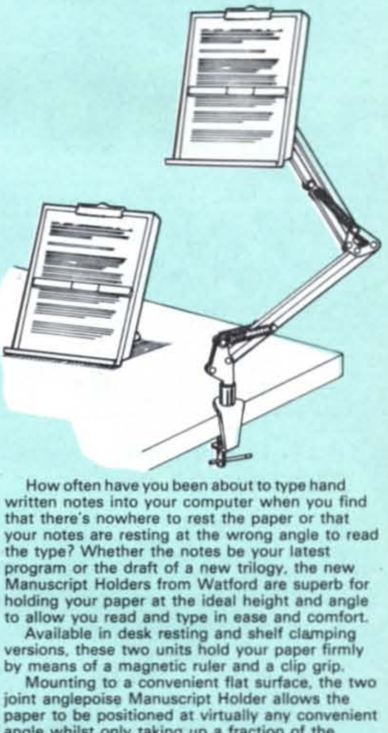
A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40/80 track double sided Disc Drives, Zenith Hi-Res green monitor, Brother HR15XL professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

Only £949

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** *(carr. £3)*

All prices in this advert are exclusive of VAT.

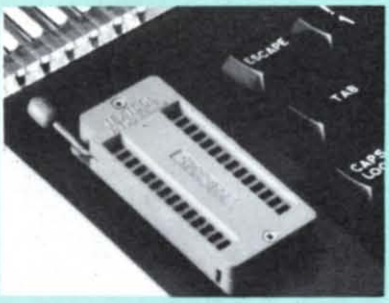
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly ano efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

Complete System	**£12**
Spare Cartridges	**£2.50**
Spare Rack	**£1.50**

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

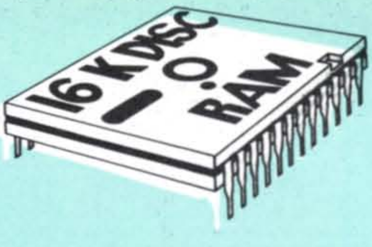
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches	**£2** each
Battery for Battery Backup	**£3**



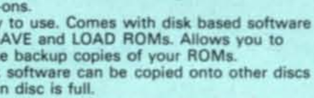
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

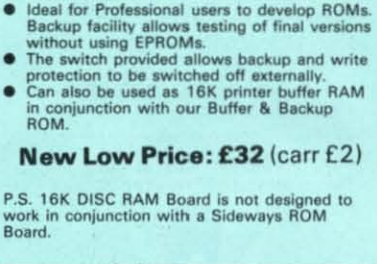
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

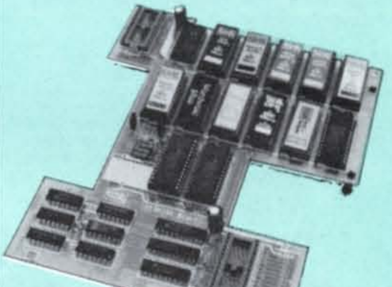
Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

- Sideways RAM for a BBC B? Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc? Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

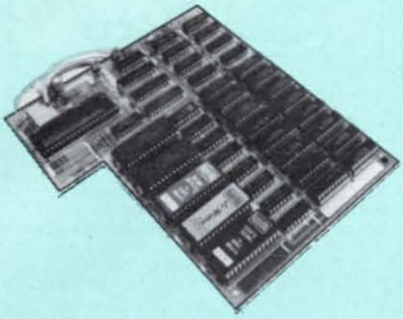
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £34
Battery backup fitted **£36**
(carriage £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

• *ROM/RAM card with 32k dynamic RAM*	***£43***
• *ROM/RAM card with 64k dynamic RAM*	***£59***
• *ROM/RAM card with a massive 128k dynamic RAM*	***£89***

(carriage on ROM/RAM Card £3)

OPTIONAL EXTRAS:

• *16k plug-in Static RAM kit*	***£6***
• *16k Dynamic RAM for Upgrade*	***£7.50***
• *Battery backup*	***£3***
• *Read and Write protect switches*	***£2** each*
Complete ROM/RAM board (all options installed)	***£99***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to MicroLink.*

- *BT Approval applied for.*

SPECIAL OFFER

Price: **£79**
(carr £3)

PROHIBITED [illegible]

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£99
(carr £3)

APPROVED [illegible]

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £87**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board (non BABT)	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

APOLLO

APPROVED [illegible]

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost – High Performance modem with Auto Dial & Auto Answer facilities as standard; we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200/1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75**
(Carr £3)
(Write in for full specification)

BT TELEPHONE CONNECTORS

LJU	1/4A Mini Line Master	**£4.50**
LJU	1/6A Mini Line Slave	**£3.00**
LJU	2/4A Line Master	**£4.00**
LJU	2/6A Line Slave	**£2.50**
LJU	3/4A Flush Master	**£3.95**
LJU	3/6A Flush Slave	**£2.75**
LJU	10/3A Dual Splitter	**£5.50**
	4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£27
Graphics ROM	£23
Disc Doctor ROM	£24
TERMI	£27
COMMUNICATOR	£49
SPEECH ROM	£26
Printmaster	£24

Wordwise £25

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET £40

INTER-CHART ONLY: £26

Inter-WORD

Only: £46

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

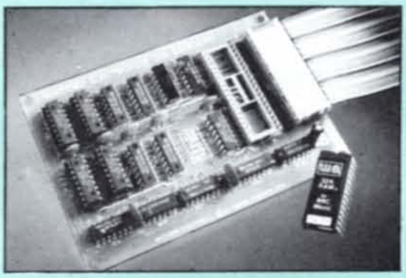
Only: **£39**

All Prices Exclusive of VAT

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B+ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

SPECIAL OFFER
Acorn's Speech Synthesiser
Package

Complete with manual in its original packaging

Clearance price Only: **£19**

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £79 (carr £2)

DATAGEM

Gemini's popular Database package

Only: £34

VIEW

VIEW WORDPROCESSOR 2.1 .... **£37**

VIEW 3.0 ROM

Price: Only **£56**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£36

VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc	**£22**
VIEW-INDEX	**£14**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

MINI OFFICE II (tape)	**£14.50**

ARIES CORNER

Aries B-32
Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20; the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many othr applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12
Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

ARIES B-488
IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 – BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 – BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

DISASSEMBLER ROM

ONLY **£16**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234/33383

النور

ARABIC ROM
for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

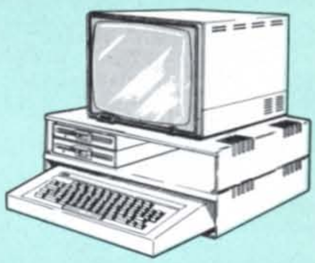
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

OFFICE MATE

The popular Database, Spreadsheet, Beebplot and Wordprocessor on Disc
£10

OFFICE MASTER

The popular Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control
£21

Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

L.B.O. Rom
Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Price only: £17

D D D Suite
Integrated Software System

-BASE **£12**
-CALC **£12**
-PLOT **£12**
COMBO PACK All 3 together **£26**

Continued ⟶

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Programming the	£22.95
6809, Programming the	£16.95
A User Guide to Wordwise Plus	£9.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for BBC	£6.95
Advanced User Guide for BBC	£15.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic Programming on the BBC Micro	£6.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC MAster 128 High Flyer	£10.95
BBC Micro Advanced Ref. Guide	£10.95
BBC Micro Advanced Programming	£10.00
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro Disc Companion	£8.95
BBC User Guide	£10.00
BCPL User Guide	£14
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.50
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£16.50
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£9.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Micro Play	£6.95
Graphs & Charts on BBC Micro	£7.50
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£15.95
Interfacing Your BBC Micro	£8.95
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing 'C'	£9.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£17.95
ISO -PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP 2nd Edition	£14.95
LISP, A Beginners Guide to	£10.95
LISP the Language of Artificial Intelligence	£9.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Mastering the Disc Drive	£7.95
Master Advance Reference Manual	£19.95
Master Reference Manual Part 1	£14.95
Master Reference Manual Part 2	£14.95
Micronet Handbook	£6.95
Programming the 6502	£16.95
Programming the Z80	£19.95
Sensing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Basic	£7.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View 3.0 User Guide	£10
View Guide	£4.50
Viewsheet User Guide	£10
Viewstore User Guide	£10
Using BBC Basic	£4.95
Wordprocessing BBC Beginners Guide	£7.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z80 Applications	£15.95
Z80 Assembly Language Programming	£19.95
Z80 Reference Guide	£9.95

EPROM PROGRAMMER

The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

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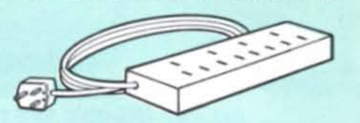

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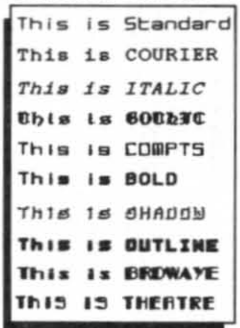
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EXAMPLE OF MFNLQ FONTS

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Toolkit gets a new lease of life

By MIKE MAHON

THE original Brom, a programmer's Basic toolkit rom from Clares, was reviewed in *The Micro User* in August 1985 when 8k sideways roms were all the rage.

Since then a number of toolkit producers have moved on to the now equally cheap 16k eproms and produced packages possessing more and advanced utilities. The questions now are: Does Brom Plus make up for the deficiencies of Brom? Is it just another toolkit or a potential market leader?

As a reminder the original 8k Brom had 21 well implemented star commands covering features such as string search and replace, program editing and shrinking, and rom switch off and it came with a well produced 36 page manual.

Its best utility was the excellent interactive full screen Basic program editor. On the minus side I did point out in my previous review that "It is rather lacking, however, in facilities for memory information, roms listing, partial renumbering, cross-referencing and tracing, and has a poor pack routine."

Brom Plus is a 16k eprom with 36 star commands and a nicely bound 62 page manual selling for around the same price as the original, which it has now replaced.

It is a service rom only and does not signature its presence at switch-on or after a Break, nor does it alter PAGE. The version reviewed – 1.02 – was tested on a BBC model B and is also fully compatible with the BBC B+, Master 128 and Compact.

The commands, shown below are grouped into three areas – general purpose and rom editing, Basic toolkit and Disc utilities. Only the commands *ONEKEY and *NORMKEY – the Electron emulators – have been removed from the original and 17 new commands, indicated by *N* in the lists, have been added.

As with the earlier version all commands may be prefixed with a Z to avoid clashes between utilities with similar names from other roms. Only the disc commands and the non-memory editing general commands worked with the 6502 second processor.

The additional rom-associated commands, allowing you to check which roms are present and which have been switched off, are an essential facility for any BBC Micro toolkit worth its salt.

The new memory editor – *MEDIT – presents the screen in a coloured Mode 7 format and has a very fast scroll facility.

However these features are not as well implemented or as comprehensive as those found on some other general purpose "super-roms", although Clares has recently announced a companion rom – Ramrod – which is complementary to Brom Plus and has a number of versatile shadow ram and Tube memory editing features.

Among the extra Basic programmer's utilities the cross referencer – *XREF –

GENERAL COMMANDS

	***CASE**	Forces upper or lower case keyboard entry.
	***FNKEY**	Gives function key information.
N	***MEDIT**	Enables the display end editing of memory.
N	***MFIND**	Searches memory for a specified string.
N	***ROMLIST**	Lists sideways roms and indicates status.
	***ROMOFF**	Turns off a rom and survives Control+Break
	***ROMON**	Reactivates a switched off rom.

DISC COMMANDS

	***COMPARE**	Verifies program on disc against one in memory.
N	***DEDIT**	Enters disc sector editor.
N	***DFIND**	Locates track and sector containing a specified string
N	***DGET**	Loads selected tracks into memory.
N	***DPUT**	Writes to selected tracks on disc.
N	***FORM**	Flexible disc formatter.
N	***MENU**	Automatic program loader.
N	***UPDATE**	Produces an information file on disc.
N	***SHUT**	Closes all files.
N	***VERIFY**	Verifies disc as readable.
N	***XCOPY**	Copies multiple files.
N	***XDEL**	Deletes multiple files.

BASIC COMMANDS

	***EDIT**	Enters the Basic full screen editor.
	***ERR ON**	Gives enhanced error messages.
	***ERR OFF**	Returns to normal error messages.
	***FIND**	String and keyword search utility.
	***CHANGE**	Alters a string or keyword
	***SCHANGE**	Allows selective alteration of strings or keywords.
	***FLIST**	Produces neat listings and splits multi-statement lines.
	***FLUSH**	Clears resident integer variables.
	***LCOPY**	Copies lines within a program.
	***LMOVE**	Moves lines within a program.
N	***LFIND**	Lists lines containing a specified string.
	***LIMIT**	Selects the range of lines to be edited and so on.
	***LVAR**	Lists the contents of variables.
	***PACK**	Removes REMs and spaces and forms multi-statement lines.
	***PAGE**	Moves a program to a specified page in memory.
N	***RENUM**	Performs a full or partial renumbering.
N	***XREF**	Cross-references lines containing variables, procedures and functions.

From Page 65

is a useful and fairly well implemented feature, although its one major omission is that it does not cross reference line numbers.

*RENUM does, however, adequately perform partial renumbering – a useful feature missing from Brom. In addition the "pretty format" listing facility (*FLIST) now operates correctly for printouts.

There have also been some improvements to the already excellent full screen Basic program editor. Control+D deletes a line from memory without having to press Control+U and Return. Control+S has also been added and reverses the case of a letter as with the similar Wordwise command.

Now you can also move backwards or forwards one screen at a time with Shift + f0 and Shift + f1 respectively, though unfortunately there is still no trace facility to allow you to display program lines or step through a program in action.

Except for *COMPARE all the disc commands are new. They provide a flexible formatting routine – *FORM, enabling a partial reformat and specification of track offsets, separate format verification – *VERIFY – and closing of all open files – *SHUT.

Individual tracks may also be written to or loaded with the *DPUT and *DGET routines and are useful for repairing corrupted disc data. The inevitable disc sector editor and string search routines are also present on Brom Plus and worked well.

In particular the disc editor can be entered directly at any sector – for example, using *DEDIT 30,4,2 for sector four on track 30 of drive two. Two unique features I found especially useful were the commands for deleting or copying multiple files at once – *XDEL and *XCOPY.

The supposedly simplified loading routine – *MENU – was not as useful as it first seemed because each disc program has to be in the & directory to be recognised by the special Brom menu facility.

Associated with the latter feature is *UPDATE which allows you to tag information on each disc file to a special file labelled %.%%%%%%%, which can be displayed when required from the Menu facility.

Brom Plus has certainly corrected most of the omissions from the original versions although it still lacks decent memory usage information, including the status of @%, major *FX commands and peripheral ports. It also has no trace, single step or rom memory viewing facilities.

Except for the full screen editor, Brom Plus offers nothing particularly exciting – we have come to expect far more from a 16k rom these days.

Perhaps combined with Ramrod in a 32k rom – when the price of these devices comes down and a little more sparkle has been added – Clares' programmer's aids could beat the other super-roms for the coveted toolkit rom slot on the BBC Micro.

Finally Brom Plus is also offered on disc at £30 for loading directly into sideways ram on the Master. Although there is no upgrade facility available owners of the original Brom can take advantage of a discount offer should they desire to buy the new version. ■

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Arrays: Entering a new dimension

BEGIN
HERE
Part
12

By PETE BIBBY

BY now you should be fairly familiar with arrays, so Program I should cause you no problems.

The action starts at line 20 which sets aside memory space for two arrays, *name$()* and *age()*. Each of these arrays has five elements, but as is my usual, wasteful practice I'll ignore the first element of each. Hence there's no reference to *name$(0)* or *age(0)* in Program I.

```
   10 REM Program I
   20 DIM name$(4),age(4)
   30 FOR loop=1 TO 4
   40 PRINT "Give me a name"
   50 INPUT name$(loop)
   60 PRINT "Give me "name$(loop)"'s
age"
   70 INPUT age(loop)
   80 NEXT loop
   90 PRINT "Give me a pointer 1-4"
  100 INPUT pointer
  110 PRINT "You picked "name$(pointe
r)" whose age is ";age(pointer)
```

Program I

Once the two arrays have been set up the FOR ... NEXT loop between lines 30 and 80 gets to work filling them.

Or rather it gets you to do the work by giving you the prompts and accepting your input. For each pass of the loop a name and an age is taken from the keyboard. In all, four names and four ages are requested.

Name	Age
Pete	36
Noreen	21
Colin	42
John	30

Table I: Names and ages

Suppose the data entered was taken from Table I. The first time round the loop, *loop* has the value 1, so the reply to the prompt of line 40 is stored in *name$(1)*. Hence *name$(1)* holds Pete.

The next prompt asks for my age, and so 36 is placed in *age(1)*. (I look years younger.) You can see that as the loop cycles, and you enter the data from Table I, so the arrays are filled.

You should also see that these are parallel arrays. It's no coincidence that there are two of them, *name$()* and *age()*, and they are there for the reason that they have something in common.

Because of the way the data has been entered, the respective elements of the arrays contain information about the same thing, or *entity* as it's sometimes known. In the case of the first element of each array the entity is me, with *name$(1)* holding my name and *age(1)* my age.

Similarly the second element of each array holds information on the same subject. *name$(2)* tells us that it's Noreen and *age(2)* that she is 21. (Again.)

Because of the fact that the arrays are parallel we can use the subscript of each element as a pointer. This can then be used to retrieve the element of each array containing the information about a particular entity. This is what Program I goes on to do in its last three lines.

Line 90 asks you for a pointer in the range 1 to 4 and stores it in *pointer*. Line 110 then uses this value as the subscript in both arrays, teasing out the information required. So if you reply 3 to the prompt of line 90, *pointer* takes the value 3 and line 110 uses *name$(3)* and *age(3)*.

Can you guess what happens if you give *pointer* a value outside the indicated range, say 11? Try it and see. Your micro is the best teacher you're likely to have. It tells you when you've made a mistake but won't tell anyone else you've made one. And it doesn't clip you across the ear, though some of the error messages it gives can be just as hurtful.

In this case the program is so simple as to be unnecessary in practice. With a more practical program it shouldn't strain your imagination to see that you could end up with lots of parallel arrays containing details of height, weight, and so on. And the ability to extract all the relevant information from a set of arrays with just one pointer is a valuable technique that will add power to your programs.

The trouble is that with the present method of entering data from the keyboard, filling a set of parallel arrays every time we run a program would take ages. There must be better methods. There are – and Program II shows one of them in action.

If you run the program you'll find that it just produces a list of the four names in Table I. Nothing unusual there, you're probably seeing them in your sleep. What is interesting is that you don't have to type in the names in response to a prompt as we've always done previously. Look no hands! Let's examine the program in more detail and see how this is done.

If you don't know that line 10 is a REMark which the computer ignores then I strongly suggest you're reading the wrong article. Line 20 is familiar enough, it dimensions the array *name$*. And, apart from line 40, the following FOR ... NEXT loop is simple enough, it just cycles four times.

Similarly the second loop, between

→

```
 10 REM Program II
 20 DIM name$(4)
 30 FOR loop=1 TO 4
 40 READ name$(loop)
 50 NEXT loop
 60 PRINT "The names are:"
 70 FOR loop=1 TO 4
 80 PRINT name$(loop)
 90 NEXT loop
100 DATA Pete,Noreen,Colin,John
```

Program II

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Micro User 12/86

From Page 67

lines 70 and 90, should cause you no intellectual suffering. It just cycles four times using the varying values of *loop* as a pointer to successive elements of *name$()*. Line 100 is definitely new material. So what do our mystery lines do?

In effect the READ of line 40 and the DATA of line 100 form a pair of commands that allow you to avoid a lot of the typing you've done previously. The READ replaces the INPUT and the DATA replaces all those names.

What happens is that when the micro comes across the keyword READ, it knows that it is to place a value or string into the variable it finds following that READ. But where does it get that value from?

The answer is that it comes from the line marked DATA. As soon as the computer hits the READ it searches down the program for the first line beginning with DATA. It then takes the first item from the list after the DATA and puts this into the variable following READ.

It also remembers its position so that next time the program executes a READ, it knows where the next data item is to come from without having to search for it. This is done automatically. All the programmer sees is that the READ reads successsive items from the list following DATA.

In the case of Program II, the micro originally comes across the READ during the first cycle of the initial FOR ... NEXT loop. As at this point *loop* is 1, this means that line 40 is attempting to read a value into *name$(1)*. The micro now looks through the program listing until it finds the first line beginning with DATA. In this case it's line 100. It then takes the first name it finds in the data list (the items after the DATA, separated by commas). In this case it's Pete, so *name$(1)* duly becomes Pete.

The second time round the loop, *loop* has the value 2. This means that line 40 is attempting to read a value from the data list into *name$(2)*. The micro has kept track of where it was up to and the result is that Noreen is read into *name$(2)*.

The program carries on in this way until the loop has cycled four times. When this has finished *name$()* is filled with the name in the data list. The subsequent loop proves this by printing out the contents of the array.

```
 10 REM Program III
 20 DIM age(4)
 30 FOR loop=1 TO 4
 40 READ age(loop)
 50 NEXT loop
 60 PRINT "The ages are:"
 70 FOR loop=1 TO 4
 80 PRINT age(loop)
 90 NEXT loop
100 DATA 36,21,42,30
```

Program III

While Program II has used READ and DATA to put strings into a string array we're not just stuck to strings. We can use our new keywords to enter values into a numeric array as Program III shows.

This is much the same as Program II except that now we're dealing with the array that holds the ages, *age()*. Reflecting this line 100, the one beginning with DATA, contains the ages from Table I. Notice again that they're separated by commas. Try leaving one out or putting it in the wrong place and see what happens.

Let's sum up what we've learnt so far. We've seen how we can use our keyword READ to take in data from a line marked DATA. And this data can be either strings – like Noreen – or numbers – such as 21.

It's a nice way of getting information into an array and saves a lot of typing. And it's quite flexible. For example, should we want to change the names in Program II to Bodger, Spot, Nelson and Ginger then we can leave the program more or less intact. All we do is add a new line 100:

```
DATA Bodger,Spot,Nelson,Ginger
```

Try it and see for yourself. And when you've done that have a look at Program IV which uses one READ to get values for two arrays.

Line 20 dimensions these two arrays, our old friends *name$()* and *age()*. Next comes the seemingly obligatory FOR...NEXT loop which cycles four times. Each time it cycles line 40 is obeyed. And line 40 is rather different from our other line 40s.

```
 10 REM Program IV
 20 DIM name$(4),age(4)
 30 FOR loop=1 TO 4
 40 READ name$(loop),age(loop)
 50 NEXT loop
 60 FOR loop=1 TO 4
 70 PRINT name$(loop),age(loop)
 80 NEXT loop
 90 DATA Pete,36,Noreen,21
100 DATA Colin,42,John,30
```

Program IV

This difference lies in the fact tht the READ now has two variable names following it, *name$(loop)* and *age(loop)*. Really this should come as no surprise. After all, we've already used Basic keywords to do two things at once as you'll see if you look at the DIM of line 20. The micro isn't bothered, it just searches out the DATA list, starts at its beginning and works its way along it, item by item.

The first time round the loop, *loop* is 1 and so the READ of line 40 is searching out content for *name$(1)* and *age(1)*. To do this it looks down to the data list starting at line 90 and takes its information from there. The first item it finds, Pete, is duly stored in *name$(1)* while the second, 36, finds its way into *age(1)*. The second time round the loop, the next pair of data items are copied into *name$(2)* and *age(2)*. In this way all the data items are entered into the arrays and the final FOR ... NEXT loop displays the results as a way of proving this.

Simple isn't it? Well it is, but there are a couple of points to pay attention to. Notice that instead of having our data items all on one line, as in the previous programs, now they are spread over two.

I didn't have to do this, but it seemed neater and I've learnt that a neat layout can help make programs more readable and so easier to understand and debug. So long as the lines begin with DATA the micro isn't bothered.

The second point is that the items in the data line have to be in the right order. Lines like:

```
 90 DATA Pete,Noreen,Colin,John
100 DATA 36,21,42,30
```

or:

```
 90 DATA 36,Pete,21,Noreen
100 DATA 42,Colin,30,John
```

won't work. Try it and see.

As an exercise can you alter Program IV so that it will accept the last two DATA lines? Have a look at line 40. And then see if you can alter the program so that it uses a pointer to pick out a name and age rather like it did in Program I.

● *That should give you something to do until next month when we'll be READing a lot more about DATA.*

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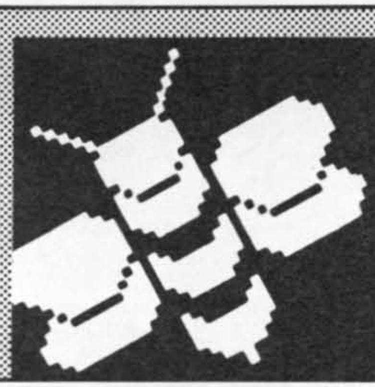

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A word in your ear - and it's all in software

By IAN McLEOD

THERE are two or three speech synthesiser systems available for the BBC Micro. Excepting Superior Software's system, they all require additional hardware in the computer and they are not compatible. If you wish to include speech in your programs they can only be used by someone else with the same system.

This article describes how to reproduce speech, or any sound, without additional hardware and how to record sound with a simple and cheap interface (shown in Figure I).

One word can be stored in roughly 1k of memory, so it should be possible to include a few words in your games or educational programs.

Digitised audio is stored in memory and reproduced by using the in-built sound chip as a digital to analog convertor (DAC). To do this it is necessary to control the sound chip from machine code.

The three tone generators of the sound chip are set to a frequency of 31kHz which is beyond the range of human hearing. The audio data is used to control the level of the 31kHz tone using the sound chips' programmable attenuators.

Because the tone generator output is a filtered square wave the output waveform looks something like a chopped version of the audio, and the sound is heard in the loudspeaker.

The programmable attenuators in the sound chip give a logarithmic law. This would severely distort the sound and so it is corrected by using a look-up table to find the control word values to pass to the chip.

The sound chip in the BBC Micro is the Texas Instruments 76489. Full details of it can be found in the Texas Instruments data sheet published in The Hardware Guide to the BBC Microcomputer. It contains three tone generators which can be programmed for frequency and level.

The frequency of each generator is controlled by a 10 bit data word and it can be calculated by frequency = 4MHz/32*F, where F is the 10 bit binary number F0 to F9. F0 is the LSB.

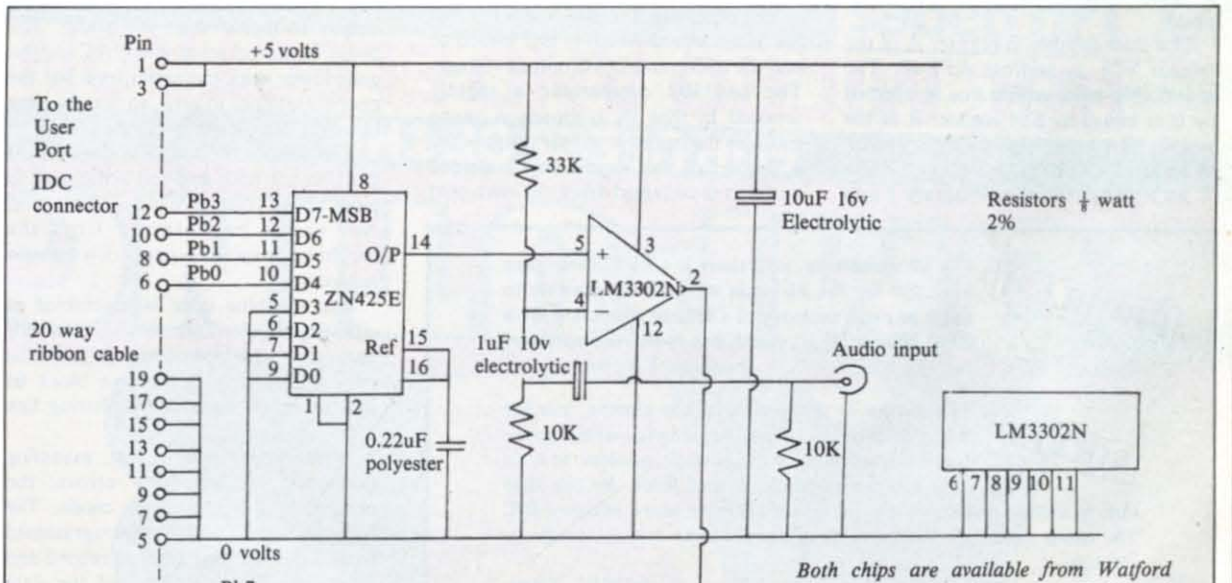
The output attenuator of each generator is controlled by a four bit data word and can be calculated as follows:

Attenuation = −2*A dB, where A is the 4 bit binary number A0 to A3, except that when A=15 the channel is off.

The chip also contains a noise generator which can be programmed for frequency and attentuation. The noise quality and frequency are controlled by a three bit data word. When the bit FB is set to 0 periodic noise is generated. When it is set to 1 white noise is generated.

The two bits N1 and N0 control the

→


Pin
+5 volts
1
3
To the User Port IDC connector
12
10
8
6
Pb3
Pb2
Pb1
Pb0
13
12
11
10
5
6
7
9
8
D7-MSB
D6
D5
D4
D3
D2
D1
D0
ZN425E
O/P
14
Ref
15
16
1
2
20 way ribbon cable
19
17
15
13
11
9
7
5
0 volts
Pb7
20
33K
5
+
3
4
−
LM3302N
2
12
1uF 10v electrolytic
0.22uF polyester
10K
10K
10uF 16v Electrolytic
Audio input
Resistors ¼ watt 2%
LM3302N
6
7
8
9
10
11

Both chips are available from Watford Electronics and Technomatic. ZN425E – 8 bit DAC. LM3302N – Quad analog comparator.

Figure I: ADC circuit

From Page 71

noise generator frequency.

N1	No	Frequency
0	0	high
0	1	med
1	0	low
1	1	tone generator 3 frequency

Noise generator frequency

The chip has eight registers which are used to control the tone generators and the noise source. During all data transfers to the chip the first byte contains a three bit address which selects the destination register. Frequency control requires a two byte transfer while attenuation and noise control require only one.

R2	R1	R0	Register
0	0	0	Tone1 frequency
0	0	1	Tone1 attenuation
0	1	0	Tone2 frequency
0	1	1	Tone2 attenuation
1	0	0	Tone3 frequency
1	0	1	Tone3 attenuation
1	1	0	Noise control
1	1	1	Noise attenuation

Register address field

In the BBC Micro the slow data bus is used to communicate with the sound chip, the speech chip and the keyboard. Data to be sent to the sound chip is put on to the slow data bus and the chip write enable line set low for a minimum of eight microseconds, then set high again.

The slow databus is register A of the system VIA at address &FE4F. The sound chip write enable line is selected by 0 in bits 0 to 2 of register B of the system VIA at address &FE40. The bit to be sent is in bit 3.

As a demonstration Program I sets generator 1 to a frequency of 1kHz at half level.

Frequency (first byte)

MSB … LSB

1	R2	R1	R0	F3	F2	F1	F0

Frequency (second byte)

MSB … LSB

0	XX	F9	F8	F7	F6	F5	F4

Attenuation

MSB … LSB

1	R2	R1	R0	A3	A2	A1	A0

Noise source

MSB … LSB

1	R2	R1	R0	XX	FB	N1	N0

Data format

Audio data is read into the computer from a very simple four bit analog to digital converter (ADC).

The in-built ADC has a conversion time of 4ms. This would allow a sampling rate of only 250Hz which is too low for audio. The ADC described here achieves a sampling rate of 5.5kHz which is adequate for intelligible speech. With two samples per byte approximately eight seconds of audio can be stored in 22kbytes of memory or roughly one word per k.

The user port is set up so that Pb0 to Pb6 are outputs and Pb7 is an input. Bits 0 to 3 are connected to the four most significant bits of the ZN425E DAC. The DAC output is connected to one input of the analog comparator.

The other input to the comparator is the audio signal which is DC biased to half the maximum DAC output voltage. The LM3302 comparator is slightly unusual in that its comparison range includes the negative supply rail, so only a single five volt supply rail is needed and this is obtained from the user port connector.

```
   10 FOR PASS=0 TO 3 STEP3
   20 P%=&C00
   30 [OPT PASS
   40 .tone
   50 SEI                 \ disable in
terupts
   60 LDA#&FF:STA&FE43    \ set all re
gister A lines as outputs
   70 LDA#&8D:JSR sound   \ chanl firs
t freq byte
   80 LDA#&07:JSR sound   \ second fre
q byte
   90 LDA#&93:JSR sound   \ chanl atte
nuator
  100 CLI:RTS             \ enable int
erupts and exit
  110 .sound              \ sound subr
outine
  120 STA&FE4F            \ send byte
to register A
  130 LDA#0:STA&FE40      \ set write
enable low
  140 NOP:NOP:NOP:NOP     \ wait
  150 NOP:NOP
  160 LDA#8:STA&FE40      \ set write
enable high
  170 RTS
  180 ]:NEXT
  190 CALL tone
```

Program I

The computer counts down from 15 and looks at Pb7 to test if the DAC output is higher than the audio. The count is stored when the DAC output goes lower than the audio level but the count continues to zero, so that the time between samples is constant.

The maximum output voltage of the DAC is 2.4 volts and this is the peak to peak audio voltage required. This level can easily be obtained from the earphone or speaker output of a cassette recorder.

The machine code is assembled at address &C00. This should work for both disc and tape users. It could be relocated in any convenient block of 256 bytes of memory by altering line 120.

When Program II is run, assuming there are no assembly errors, the computer is left in direct mode. The function keys f1 and f2 are programmed to call the machine code to record and playback. The high byte of the data memory start and end addresses can be changed by altering locations &75 and &76.

This facility can be used to record a

PROBLEM

I WAS wondering, now there is a RS423 interface available for the Electron would it be possible to use it as extra memory or a second processor for a BBC Micro? If so could you load rom software from the Plus 1 into the BBC? – G.P. Hawkins, Chippenham.

SOLVED

The answer to these questions is always "yes but it's not worth it". You would need some communication software in each machine to send data and messages back and forth. By the time that is written and installed you would not have much memory left. The extra memory would only be of use for data and not program storage.

As to rom software, you could transfer it to the BBC Micro providing you had some sideways ram to put it in. The extra software needed would have to transfer the data and you would have to arrange some protocols to signify start and finish.

```
10 REM Speech without a chip
20 REM By Ian McLeod
30 REM (c) The Micro User
40 REM
50 *KEY1 CALL rec|M
60 *KEY2 CALL play|M
70 ?&74=35:REM play speed
80 ?&75=&22:REM memory start
90 ?&76=&7B:REM memory end
100 VDU15
110 FOR PASS=0 TO 3 STEP3
120 P%=&C00
130 [OPT PASS
140 .rec SEI
150 LDA#0:STA&70
160 LDA&75:STA&71
170 LDA#&7F:STA&FE62
180 LDY#0
190 \ main loop, stores bytes
200 .rec1 JSR nib
210 STA(&70),Y
220 INC &70:BNE rec1
230 INC &71
240 LDA&71:CMP&76:BNE rec1
250 CLI:RTS
260 \ Pack 2*4 bit samples per byte
270 .nib
280 LDA#2:STA&72:LDA#0:STA&73
290 .nib1 JSR read
300 DEC&72:BEQ nib2
310 LDX#10
320 .nib3 DEX:BNE nib3
330 STA&73:JMP nib1
340 .nib2 ASLA:ASLA:ASLA:ASLA
350 ORA&73
360 RTS
370 \ Read 4 bit sample from ADC
380 .read
390 LDX#&10
400 .read1 DEX:BEQ read3
410 STX&FE60
420 LDA&FE60:BMI read1
430 TXA
440 .read2 DEX
450 NOP:NOP:NOP:NOP:NOP:NOP
460 BNE read2:RTS
470 .read3 TXA:RTS
480 \
490 \ Playback
500 .play SEI
510 LDA#&FF:STA&FE43
520 LDA#&84:JSR sound
530 LDA#0:JSR sound
540 LDA#&A4:JSR sound
550 LDA#0:JSR sound
560 LDA#&C4:JSR sound
570 LDA#0:JSR sound
580 LDA#0:STA&70
590 LDA&75:STA&71
600 .play1 LDY#0
610 LDA(&70),Y:AND#&0F
620 JSR fog
630 LDY#4
640 .loop DEY:BNE loop
650 LDA(&70),Y:AND#&F0
660 LSRA:LSRA:LSRA:LSRA
670 JSR fog
680 INC&70:BNE play1
690 INC&71
700 LDA&71:CMP&76:BNE play1
710 LDA#&0F:JSR fog
720 CLI:RTS
730 \ Send byte to sound chip
740 .sound
750 STA&FE4F
760 LDY#0:STY&FE40
770 NOP:NOP:NOP:NOP
780 NOP:NOP
790 LDY#8:STY&FE40
800 RTS
810 \ Look up atten values, send to
 3 chans
820 .fog TAY:LDA table,Y
830 ORA#&90:JSR sound
840 ORA#&20:JSR sound
850 EOR#&60:JSR sound
860 LDY&74
870 .del DEY:BNE del
880 RTS
890 .table:]
900 NEXT
910 !table=&01010000:table!4=&03020
201
920 table!8=&07060504:table!12=&0F0
C0908
930 CLS:FOR A=0 TO 1
940 VDU131,157,132,141:PRINT"     T
he talking computer."
950 NEXT
960 PRINTTAB(6,6)" Press f1 to reco
rd."
970 PRINTTAB(6,8)" Press f2 to play
back."
980 END
```

Program II

short piece of sound or to find a particular word in a longer piece and then save that section of memory to disc or tape. The initial value for start is &22 and for end is &7B.

For example to playback then save a word found between say &3000 and &3500 enter:

```
?&75=&30
?&76=&35
```

Then press f2.

```
*SAVE"WORD"3000 3500
```

The word saved on disc or tape can be loaded and played back by:

```
*LOAD"WORD"2200
?&75=&22
?&76=&27
```

Then press f2.

The playback speed can be varied by changing the contents of location &74.

PROGRAM STRUCTURE

70-90	Set up initial values for speed, memory, start and end.
110-130	Set up assembler parameters, listing and report errors.
150-160	Set up memory start.
170	Sets up user port.
190-250	Main loop for record, stores data bytes and increments memory pointer.
240	Tests memory end.
260-360	Pack two samples into a single byte.
370-470	Read a 4 bit sample from the ADC. Start from 15, decrement count and output it to user port. If bit 7 of user port is low store the count, continue till zero.
510-570	Set all three tone generators to 31kHz.
580-590	Set up memory start.
600-690	Main play loop. Splits a byte into two samples.
700	Tests for memory end.
740-800	Send a byte to the sound chip.
820-880	Look up the values to send to sound chip attenuator control, send this value to the three generators.
860-880	Delay to set playback speed.
910-920	Use the ! operator to store the look-up table in memory.

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WS3024 2400/2400 fd	£570 (b)
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GEC DATACHAT Modem V23 1200/75, 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. **Special offer price**	£39 (b)

PROGRAMMING ACCESSORIES/SOFTWARE

See page 8 for detailed specification

Compatible with B, B+ and Master

EPROMER II with disc based software and rom image	£99 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 128K	£185 (b)
PORTAL EPROM EMULATOR 512K	£285 (b)
TEAM Disassembler	£145 (b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

CAD/DRAWING PACKAGES

NOVACAD CAD Package for B, B+ & MASTER (See page 9 for specification)

BBC COMPUTER
& ECONET
REFERRAL CENTRE
ESTABLISHED OVER 15 YEARS

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

BASIC Version	£79 (d)
Tracker Ball/Mouse Version (TM)	£99 (d)
TM Version plus Tracker Ball	£129 (c)
TM Version plus Mouse	£115 (c)
Plotter Driver Generator	£28 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£67 (d)
Super Art	£43 (d)
PAGEMAKER	£39 (d)
3D ZICON	£21 (d)
PAINTPOT	£21 (d)
DATABASE	£21 (d)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£52 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£52 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

SOFTWARE
CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

BBC SOFTWARE/ FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb	£37 (d)
STARdataBASE A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW.	£49 (d)
MASTERFILE II Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T)	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0 New version of VIEW compatible with B+ complete with a printer driver generator.	£56 (c)
Hi-VIEW Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text.	£36 (d)
VIEWSPELL Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words.	£29 (d)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper.	£9 (d)
DOT PRINT PLUS Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP.	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
WORDEASE A 16K rom based utility for WW+	£24 (d)
SPELLCHECK III A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc.	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor.	£37 (d)
VIEWPLOT A disc based plotting program. (To be released soon).	£22 (d)
INTERSHEET The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc.	£39 (d)
INTERCHART Graphics package for Intersheet	£27 (d)
ULTRACALC BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc.	£52 (d)
QUICKCALC A disc based economically priced spreadsheet package (40 or 80T Disc).	£14.50(d)
MINI OFFICE II A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T)	£14.75(d)

LANGUAGES

META ASSEMBLER Multi processor Assembler full details on page 8	£145 (c)
TEAM DISASSEMBLER	£145 (b)
ACORN 6502 DEV. PACKAGE A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor.	£43 (d)
MACROM A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory.	£33 (d)
ACORN MICRO PROLOG Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly.	£62 (d)
ISO-PASCAL Acorn's full implementation of International Std Pascal on 2x16K roms.	£48 (c)
ISO PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL A fast P-code compiler and stand alone utility (40 or 80T).	£36 (d)
BCPL	£46 (c)
BCPL CALCULATIONS Supports floating point, fixed point and fast integer calculations on BCPL	£17.50 (d)
BCPL STAND ALONE GENERATOR	£39 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT A frame based authoring system from NPL for interactive computer tutoring. Disc based	£52 (c)
MICROTEXT PLUS Extended Features incl extra memory, control of external devices etc. Rom based.	£229 (b)

COMMUNICATIONS

TERMULATOR Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations.	£25 (d)
COMMSTAR A highly popular communication rom suitable for all general purpose applications (specify B or Master)	£28 (d)
COMMUNICATOR A full 80 col VT100 emulation program with easy to follow screen menus.	£49 (d)
DATABEEB A variety of facilities for use with WS2000 Modem	£26 (d)
DS1 DISC Special utilities for use with WS2000	£10 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£22 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual Cassette	£9.50 (d) £9 (d)
EXMON II	£23 (d)
HELP II	£25 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£22 (d)
PRINTMASTER	£24 (d)
DUMPMASTER supports about 40 printers	£26 (d)
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
BILLBOARD	£18 (d)
STUDIO EIGHT	£19 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
CC SPEECH ROM	£28 (d)
CC SPEECH ROM to Text Rom	£34 (d)
ACORN SPEECH ROM	£15 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

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24 hr viewdata system)
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elex: 922800

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Orders welcome from
government depts &
educational establishments.

All prices ex VAT.
Prices are subject
to change without notice.

Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY:
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. **Disc £11 (d)**

COMPUTERS AT WORK:
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. **Aud/EC/disc £16 (c)**

PICTURE CRAFT
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. **Disc £17 (d)**

DRAWSTICK
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. **Cass £8 (d)**

INTRODUCING GEOGRAPHY
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. **Disc £16 (d)**

MATHS WITH A STORY 1
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. **Cass £8 (d)**

MATHS WITH A STORY 2
Similar programs as 1 but covered from a different angle. **Cass £8 (d)**

NUMBER GAMES:
6 programs designed to stimulate the mind of an active child of 8 years and upward. **Cass/EC £7.50(d)**

USING YOUR COMPUTER
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. **Cass £24 (c)**

WORD PLAY
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. **Cass £10 (d)**

WORD MOVER
A simple text editor. **Cass £8 (d)**

SECONDARY LEARNING

ADVANCED LEVEL STUDIES: STATISTICS
5 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. **Disc £23 (d)**

ADVANCED STUDIES: GEOGRAPHY
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. **Cass £10 (d)**

INSIDE INFORMATION
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres.
Prog Cass £10 (d)
Audio Cass £5 (d)
Book £8 (d)

OPEN LOGO
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

SCIENCE TOPICS (ST)

S.T.: WAVES
A Physics program allows display of waveforms and shows changes caused by different parameters. **Disc £14 (d)**

S.T.: RELATIONSHIPS
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. **Disc £14 (d)**

S.T.: BONDING
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. **Disc £14 (d)**

S.T.: ELECTROMAGNETIC SPECTRUM
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. **Disc £14 (d)**

S.T.: ELECTRONICS IN ACTION
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. **Disc £14 (d)**

S.T.: NEWTON & THE SHUTTLE
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. **Disc £19 (d)**

S.T.: ECOLOGY
Simulation program managing a nature reserve to meet a host of individual needs. **Disc/EC £19 (d)**

S.T.: POLYMERS
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. **Disc/EC £19 (d)**

S.T.: CLASSIFICATION & PERIODIC TABLE
A database program for producing different classifications of chemical information and presented in any format. **Disc £20 (d)**

S.T.: FOOD & POPULATION
Simulation in space of biological aspects of nutrition and food production logistics. **Disc £20 (d)**

SEC. SCIENCE: MICROTECHNOLOGY
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. **Cass £7 (d)**

SEC. SCIENCE: THE MOLE CONCEPT
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. **Disc/Aud/EC £16 (c)**

SEC. SC.: UNIFORMLY ACCELERATED MOTION:
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. **Disc/AUD/EC £16 (d)**

VU-TYPE
The popular 'Sight & Sound' touch typing tutor with alterable settings. **Disc/EC £15 (d)**

GENERAL

GAME CORE
Provides information and intelligence routines for writing board games. **Cass £9 (d)**

VU TYPE PROFESSIONAL
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. **Disc £19 (d)**

WHITE KNIGHT MK II
(Specify if for Master). **Disc £16 (d)**

BATTLEFIELDS **Cass £8.50 (d)**

DEUTSCH DIREKT
Disc based vocabulary learning prog with audio cassette to help with pronounciation.
Disc/aud/EC £16 (c)
Book £5.95 (d)

A VOUS LA FRANCE
A home study aid for anyone learning French.
Cass/EC £12 (d)
Book £5.25 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

PRINTER ACCESSORIES

EPSON ACCESSORIES:	
Interfaces:	
8143 RS232	£28 (d)
8148 + RS232 + 8K	£75 (d)
8165 IEEE + Cable	£65 (d)
8148 RS232 + 2K	£57 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)
Parallel & Serial Buffers of various size also available.	
FX80/80 + /85 Tractor Attachment	£37 (c)
FX80/80 + Paper Roll Holder	£17 (c)
LX80 Tractor Feed	£20 (d)
LQ800 Tractor Feed	£44 (b)
LQ1000 Tractor Feed	£49 (b)
SHEET FEEDERS:	
8338 LX80	£49 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
8330 RX80 +	£129 (b)
LQ800	£129 (b)
LQ1000	£159 (b)
Ribbons:	
RX/FX100/100 + . FX105	£10 (d)
RX/FX80/80 + , FX85	£5 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d)
LQ1000	£10 (d)
H180 Pen Set (Aqueous/Ball point)	£7.50 (d)
Dust Covers:	
FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100 £7.50 (d) **KP910**	£7 (d)
HITACHI 672 Plotter	
Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)
TAXAN CANON Accessories:	
RS232 + 2K buffer	£78 (d)
Ribbon	£6 (d)
JUKI 6100	
RS232 Interfaces	£65 (d)
Tractor Feed	£129 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£182 (a)
BROTHER HR15	
Daisy Wheel	£18 (d)
Tractor Feed	£90 (a)
Ribbon (Carbon/Nylon)	£3.00 (d)
Sheet Feeder	£182 (d)
Keyboard	£135 (a)
Printer Leads:	
BBC Parallel Lead (1.2m)	£10 (d)
BBC Serial Lead (1.2m)	£6 (d)
Other lengths can be supplied on order:	
IBM Parallel Lead (2m)	£12 (d)
PAPER & LABELS	
Plain Fanfold paper with micro perforations:	
2000 sheets 9½" × 11"	£13 (b)
2000 sheets 14½" × 11"	£18.50 (£4.50)
Labels/1000:	
Single Row 3½ × 1 7/16"	£5.25 (d)
Triple Row 27/16" × 17/16"	£5 (d)

BBC SPARE PARTS

All Prices are Retail ex-VAT carriage code (d).

BBC & Misc:	
Keyboards	£52 (b)
Powers Supply	£52 (b)
Keyswitch	£1.75
Video ULA	£18
Serial ULA	£14
DNFS	£18
UHF MOD	£4.50
6502A CPU	£6.50
65CO2 CPU	£12
6522 VIA	£3.50
6522A VIA	£5.50
LM324	£0.45
74ALS 245	£5
88LS120	£3.00
BBC PLUS:	
PAL16REN	£13.50
64K × 4 DRAM	£8.50
6512A	£12.50
SAA5050	£9.00
6845SP	£6.50
UPD7002	£5.00
DS3691	£3.50
7438	£0.40
!4LSOO	£0.24
74LSO4	£0.24
74LS10	£0.24
74LS123	£0.80
74LS163	£0.75
74LS244	£0.80
74LS245	£1.10
74LS373	£0.90
74LS393	£1.00
BBC MASTER:	
1-Mbit ROM	£39
MSI CHROMA IC	£13.50
65SC12P-2	£12.50

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ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

- NS32016 8MHz Main Processor & 32081 FP processor.
- 20 Mbyte Winchester and one 80T Ds floppy drive.
- A detachable keyboard Hi Res RGB Monitor.
- 4Mbyte of on board Ram as standard.
- Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
- Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
- **Phone for detailed leaflet.**

32016 CO-PROCESSOR

A second processor that brings genuine 'Mainframe' power to the BBC Computer.

- Interfaces with the BBC through the tube connector.
- NS32016 6MHz CPU & 32081 FP processor.
- 1Mbyte Ram as standard.
- Packaged software includes all the languages and utilities supplied with the ACW Work Station.
- **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (non-Acorn) for the Co Processor for 8Mhz operation to enable use of ADFS with the floppy drives is available. It can be fitted at no extra charge if ordered with the Co Processor.

A list of software available for the 32 bit processors is available on request.

512 CO-PROCESSOR

Brings professional software to the BBC Master.

- 10 Mhz 80186 *DOS PLUS.
- GEM Write & GEM Draw.
- 'WIMP' Environment with high quality Mouse.
- Runs many 'IBM' programs — even 'Flight Simulator'!
- Convert to/from IBM/BBC data.

DOTPRINT PLUS

A uniquely versatile NLQ ROM for the BBC Micro.

- Built-in character font generator.
- Built-in view printer driver.
- Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
- True bold print as well as double width.
- 12 character pitch as standard.
- Fully variable pitch and line spacing.
- Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
- **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
- **DOTPRINT DUAL** for EPSON MX range.

MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.

THE
BBC
MASTER SERIES
MICROCOMPUTER

For price details see page 1.

Compact
BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

THE FAMILY COMPUTER

Now available from stock

This low cost high tech computer has developed specially as a computer for home use.

SPECIFICATION

128K RAM, ADFS Filing system, BBC Basic version 4, MASTER style keyboard, a single 640K 3.5" double sided drive. RGB/Mono Monitor as an optional extra.

Bundled software pack includes: Desk Top Prog with note pad & calculator, VIEW 3.0, Card Index, & LOGOTRON. A set of exciting games and graphic demos.

IMPORTANT NOTICE

We would like to advise all our customers who purchased the BBC Master Computer from us between January to June 1986 to ensure that the ram batteries are replaced. The replacement kits are available free of charge.

EPSON LQ800/1000

Uses top quality 24 pin dot-matrix technology.

- Superb 'letter quality' at 67cps.
- Fast clear draft quality at 200cps.
- LQ/Draft modes selectable from front panel.
- Variety of fonts, usable in both draft & LQmodes.
- Optional 'personality' modules for Diablo and IBM emulation.
- Optional Font modules.
- Friction feed.
- Hi Res bit image graphics with hex density.
- 7K buffer, both serial and parallel interfaces as standard.

EPSON HI-80

- A4 with 4 colour precision plotting.
- Low cost while maintaining precision.
- Variety of pens available.
- Ideal for overhead transparencies.
- Powerful software commands allow complex plots.
- Superb line/bar/pie charts simply produced.

EPSON EX800

A new addition to the EPSON range provides faster printing speeds to offer versatility in volume printing. This 80 column printer prints at 300 cps in 12 cpi mode, 250 cps in 10 cpi and 50 cps in letter quality mode. Four built in fonts, including two letter quality fonts can be printed in a variety of typestyles. Full graphics facilities are included. Most selection from the front panel. Parallel and serial interfaces and tractor and friction feeds are standard. Four colour printing option available.

NAT. PANASONIC KX P1080

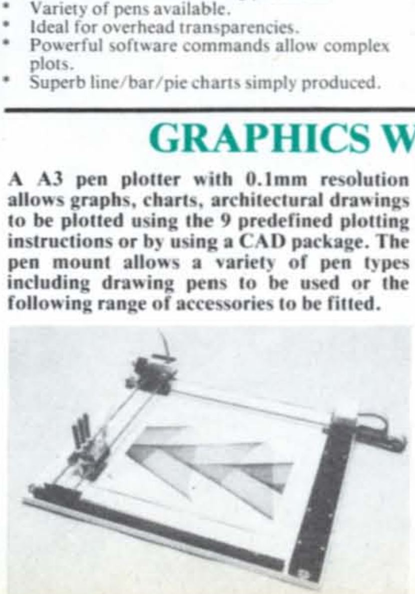
A high performance low cost printer with full character pitch feature 10, 12, 15 & 17 cpi and proportional spacing in both draft and NLQ mode. 80 column, 100 cps draft and 20 cps in NLQ. Parallel interface and Friction and Tractor feeds as standard. Epson Compatible Graphics.

HITACHI 672

- A3 four colour precision plotter.
- Serial and parallel ports as standard.
- Produces 'OHP' transparencies as well as plain paper.
- 'HP' graphics language or single character commands.

GRAPHICS WORKSTATION

A A3 pen plotter with 0.1mm resolution allows graphs, charts, architectural drawings to be plotted using the 9 predefined plotting instructions or by using a CAD package. The pen mount allows a variety of pen types including drawing pens to be used or the following range of accessories to be fitted.



OPTICAL SENSOR

This converts the plotter into a input device and offers a new range of applications: Scan or digitise a picture or a drawing to display or store. Traverse mazes and investigate methods of artificial intelligence. Reliably read bar codes.

DRILL/ROUTER

This will drill holes, machine moulds and cut complex 3-D shapes in a range of suitable materials to a depth of 16mm. Driver software is supplied on disc and an optional application program is available to interface the drill/router to our NOVACAD package.

SCRIBER

The sharp pointed scriber may be used to etch fine line drawings on surfaces such as scraperboard, wax coated copper etc. Full details on request. See page 1 for price.

All accessories available separately if required.

TECHNOLINE
24 hr viewdata system)
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Telex: 922800

RETAIL SHOPS
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Tel: 01-208 1177 Telex: 922800
(close to Dollis Hill ⊖)

West End Branch
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For fast delivery telephone
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Orders welcome from
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(a) £8.00 (Datapost)
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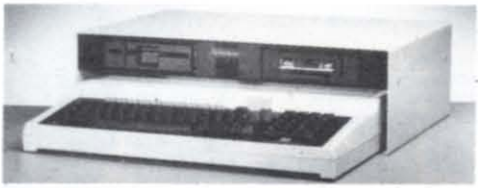
(c) £1.50
(d) £1.00

TS 400

PD 800

PD 800 P


P2041 HT

DISC DRIVES

TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

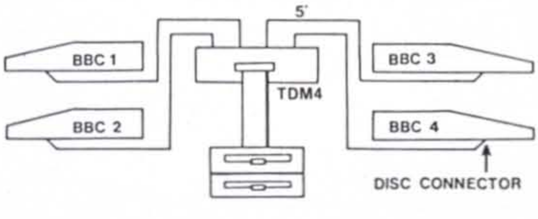
* P20HD Stand alone.
* P204HP With a single floppy housed in a plinth version case.
* P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
* TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

ALL TECHNOMATIC DRIVES NOW CARRY A TWO YEAR WARRANTY

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)
TDM2 Dual Unit (2 computers)

WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highiy popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data between the computers. (Not recommended for use with randon access files).

3M FLOPPY DISCS

FREE
Clock/calculator with every 5 boxes of 3M discs purchased.

Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs.
While offer lasts discs will be supplied at specially reduced prices.

FLOPPICLENE Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25" and 3.5" drives. Please see page 2 for prices.

BBC COMPUTER
& ECONET
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ESTABLISHED OVER 15 YEARS

TECHNOMATIC

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305 Edgware Road, London W2 Tel: 01-723 0233

MODEMS

MIRACLE WS4000

- A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
- Plain English commands make it simple to use, even for the first time user.
- Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
- Equalisation model in V23 for line-noise filtering.
- Many other options including upgrading to V22 and V22 bis.

MIRACLE WS2000

- A comprehensive manually switched 'World Standard' modem.
- Competitively price with a capability to be upgraded for various options.
- BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
- Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).

- SK1 chip set for computer control.
- User port cable.
- Auto dial Board.
- Auto Answer Board.
- DS1 disc for auto dial facilities on Commstar.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.
MODEM V22bis
MODEM V22
MODEM V21 23

WS 3000 Range

Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.

Please see page 2 for prices

MIRACLE WS3000 RANGE

- A professional range of intelligent modems with full BABT approval.
- Auto Answer and Auto Dial facilities installed as standard.
- HAYES protocols implemented.
- Pulse or DTMF 'tone' dialing.
- Plain English command structure simplifies the use of the modem.
- Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
- A line sharing facility to differential between data and voice calls.
- Intelligent speed buffering converts 1200/1200 terminals to 1200/75
- Equalisation mode for line noise filtering.
- Internal battery back up for storing 63 names, numbers and default settings.
- Upgrade path for 1200/1200 and 2400/2400 and security encryption.
- Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

SPECIFICATIONS

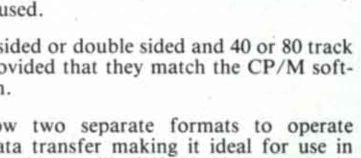
WS4000 V2123:	*CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75.
WS3000 V2123:	*CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75
WS3000 V22:	*As V2123 and also 1200/1200 full duplex.
WS3000 V22 bis:	*As V22 and also 2400/2400.

MULTIFORM Z80

includes a FREE Pocket Wordstar package

A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.

> **" A wide selection of programs were installed and tested without problems. The task of transfering and installing the programs for the system was greatly eased by the flexibility of the multiformat approach and the implementation of the terminal emulators. *Ed Brown Acorn User Oct 86.* "**



Please see page 1 for prices

- It is capable of running most CP/M 2.2 format applications programs on the BBC.
- Connects to the BBC via 1MHz bus, no restriction on the cable length. OS/M operating system on rom.
- Integral mains psu and 64K on board ram.
- 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
- Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
- Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M.
- Multiform is fully compatible with Acorn's 8271 and 1770 DFS on models B, B plus and the Master.
- Single density dfs allows single density CP/M format use. Double density dfs allows both single and double density CP/M formats to be used.
- Single or dual, single sided or double sided and 40 or 80 track drives can be used provided that they match the CP/M software format to be run.
- Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
- Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
- Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

ECHNOLINE
24 hr viewdata system)
el: 01-450 9764

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(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

EPROMER III
Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.

The single rail eproms handled by the EPROMER III are:

●2716 2732 2764 27128 27256 27512 27513
2516 2532 (NMOS & CMOS)
●One time eproms P27XXX, 87CXXX etc.
●Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike.

The main features of the programming software are:

* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
* Automatic Intelligent identifier support for eproms able to respond.
* Selectable programming voltage 25/21/12.5V
* 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
* Serial port protocols supported.
* Intel HEX, Motorola S, HEX and ASCII protocols supported.
* DFS/ADFS and Rom Filing System Supported.
* BASIC/Machine Code programming using RFS.
* Powerful editor with input in HEX or ASCII.
* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Software interface provided for users own application (alternate byte program etc)

EPROMER III interfaces with the BBC through the 1 MHz bus, has a mains integral mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

PORTAL 128 (2716, 2732, 2764, 27128):
PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

MICROPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micropromer program the device.

* Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
* Comprehensive error reporting and checking.
* Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
* Support for DFS, ADFS and cassette filing systems.
* Edit data in Hex or ASCII.
* Total control via software, no switches to worry about.
* Supplied with user manual and software on diskette.
* MPROMER simply plugs into the EPROMER II ZIF socket.

TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc): updates soon for most of Meta processors.

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dissassembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

BOOKS

No VAT Carriage Code (c)

LANGUAGES	
6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPL User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The UNIX Book	£7.50
Unix User Guide	£19.95
Understanding Unix	£18.45
BBC MICRO GUIDE BOOKS	
BBC User Guide Acorn	£15.00
BBC Plus User Guide	£15.00
Drawing your Own BBC Programs	£6.95
Inside Information	£8.95
Math Prog in BBC Basic	£7.95
Toolbox 2	£10.95
VIA 6522 Book	£4.50
PROGRAMMING/UTILITY	
Advanced Sidewise Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Advanced User Guide	£12.50
Applied Ass./Lang on the BBC	£9.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC ROM	£9.95
Beginners Guide to W.P	£7.95
View 3.0 User Guide	£10.00
Viewstore	£10.00
Viewsheet	£10.00
Wordwise Plus	£9.95
SOUND & GRAPHICS:	
Mastering Music	£6.95
DISC DRIVE SYSTEMS:	
Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
APPLICATIONS:	
Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
PROFESSIONAL SOFTWARE	
Wordstar made easy	£16.95
Introduction to Wordstar	£17.95
Wordstar Handbook	£11.95
dBase-II for the first time user	£16.95
Understanding dBase-III	£22.95
Multiplan Made Easy	£18.95
Multimate Complete Guide	£16.95
ABC of LOTUS 123	£17.45
1-2-3 for Business	£16.95
Adv Tech in dBase II/III	£22.95
Mastering CP/M	£17.95
CP/M Bible	£16.50
Introducing CP/M on BBC & Z80	£9.95
MS/PC DOS Prompt	£10.95

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NOVACAD

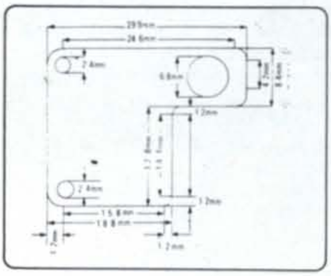
Computer Aided Draughting for the BBC Micro

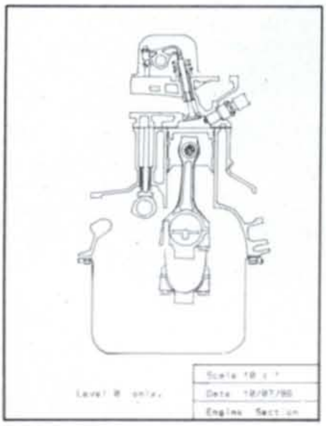
> *" The Novacad system is a thoughtfully designed piece of software requiring a minimum of manual bashing so that real results are possible with just a few hours work. "*

> *" Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market". "* **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

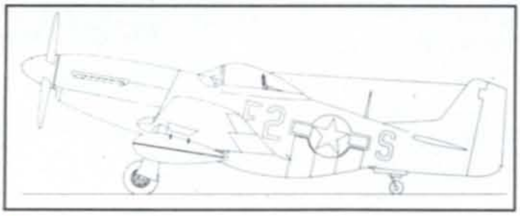
NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

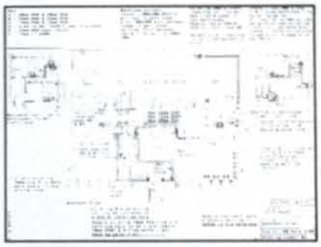


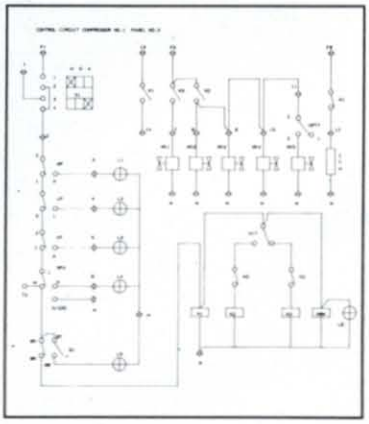


The major features of NOVACAD are:

- Simple and easy to use with logical command sequence.
- A large drawing area (approx 15 screens).
- The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
- A zoom facility allowing magnification of up to 20 times to insert finer details.
- Block copy of shapes on the screen for repetitive use.
- Text entry at any 90° orientation at any position on the screen.
- Create multi layer drawing with 8 levels available.
- Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
- Printer routine for Epson 80 and 136 column printers.
- A unique facility to output to any BBC compatible plotter.







MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.
6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

NOVACAD is available in two versions

*BASIC version for cursor control from the keyboard.

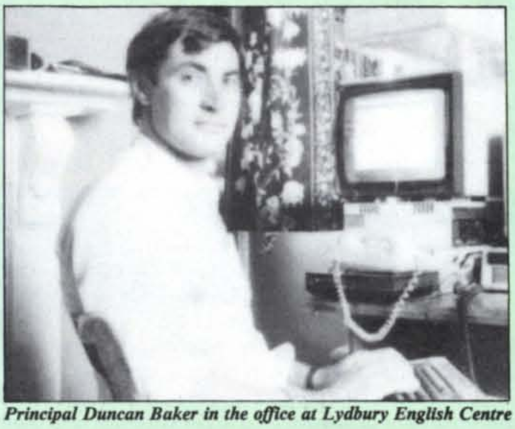
*T/M version for cursor control from the keyboard, Tracker Ball or a Mouse.

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

ROUTCAD, an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.



Principal Duncan Baker in the office at Lydbury English Centre

From submarines to business, via the BBC Micro

By TONY LEAH

AFTER a career as a Royal Navy officer, followed by eight years in the diplomatic service, Duncan Baker decided it was time to drop anchor.

Equipped with a BBC Micro that had accompanied them on their travels, plus plenty of optimism and energy, Duncan and his wife Rita ploughed their savings into a business venture.

Not for them the safe harbour of a post office, boutique or pub – they wanted to create something of their own from scratch.

The question being, just what were a submarine navigation officer and a housewife-cum-mother-of-four qualified to do in the world of commerce?

They found the answer in their respective backgrounds.

Rita had previously been a teacher for 14 years, with post graduate qualifications in teaching English as a foreign language. Duncan knows exactly what it is like to be immersed in language training, having spent 15 months studying Arabic for a Foreign Office posting.

It was this combination that decided them to buy a rambling old vicarage in the Shropshire countryside and open the Lydbury English Centre – offering residential language courses to foreign businessmen and government officials.

The business itself, and the teaching of English as a foreign language, are conducted on BBC Micros.

Up to a dozen students are accommodated at one time, assimilated into the life of the Bakers and their children, even to the extent of taking their main meals with the family. They are taught in groups of three or four. "From my own experience I know one-to-one is too intensive", says Duncan Baker, "and big classes lack individual attention".

Two BBC Micros are installed in the Centre's largest tutorial room, each with a 100k single disc drive and monitor. "Our software is very largely Mr T and *The Micro User* educational material, with the vocabularies altered where possible for foreign learner use", says Duncan.

"Some of the material is not directly educational, but we use it for relaxation and light relief from studies. Both students' micros are also fixed up with sideways ram capsules. I use these to run some simulated rom software, and I'm trying to adapt some of our programs to run with Superior Software's Speech to help one of our students who is blind".

The office BBC Micro is used almost exclusively for word processing and communications.

With the help of an Epson and Fontwise, the Bakers produced "quite acceptable" camera-ready proofs for their prospectus and various other bits of copy. "It has saved us a good deal on printing bills and some degree of effort in proofreading", says Duncan.

"We have sent out more than 1,400 copies of our brochure, each one with an individual letter, thanks to Wordwise Plus, Wordaid and our Juki.

"I have now stored set Wordwise forms for invoices, replies to enquiries, receipts and so on, and this saves me a lot of time and effort".

The other main use of the machine is communications. The Centre subscribes to Prestel Education Service, advertising on Page 21171, and also uses the system often for travel information, educational software, "and generally keeping in touch with the world of education", adds Duncan.

"But our main asset has to be MicroLink. Our students and potential students come almost entirely

→

From Page 83

from the world's business communities and from government service, so we have to be able to communicate and receive messages quickly, reliably and accurately.

"Initially we took out a subscription to MicroLink for its telex facilities – telex being, from my experience, a far more reliable means of communicating between countries than mail or even telephone.

"The bonus with MicroLink is the electronic mail and bulletin board facilities. Through these we have made more friends, established new overseas contacts, and received more enquiries than any other means – direct mail and print advertising included. This was not foreseen, but may well make a big difference to the amount of business we shall do in our first year or so".

Duncan and Rita bought their first BBC Micro for entertainment and to fill gaps in their children's education while on overseas postings.

"Had I known we would eventually use the machine for business I would have bought larger capacity drives", Duncan says. However, I do find the 100k disc capacity useful in some ways, in that I rarely fill the catalog and I can keep separate discs for separate subjects without feeling I'm wasting capacity.

"The twin drives I regard as virtually essential and I continue to be glad I stood up to the salesman who tried to convince me to buy a single double-sided 80 track drive instead.

"I feel it is very valuable to be able to keep my utilities disc in drive 0. This contains various function key parameters for my favourite Wordwise Plus embedded commands and standard page set-ups for letterheads, invoices and so on. Drive 1 is then kept clear for whichever working disc I am on. I find this works well and also shares the load better between the two drives – I don't want one to wear out before the other".

The BBC Micro-based system now used in the Centre's office is basically the same as the one the Bakers bought for their children. They have added an ATPL board with 16k of sideways ram, a shadow ram board – virtually essential with the amount of word processing done – and a second printer with NLQ facility.

Other additions are a screen dump for Prestel, Disc Doctor and Caretaker for onboard formatting, single key and squashing facilities, and Rom Master "for seeing what's going on inside the micro and to give our student records password security".

There's also Commstar, which Duncan says does everything he needs on Prestel and, with Mini Office II, covers his bulletin board and communications needs. Wordaid is used for mailshotting the Wordwise Plus output, and Spellcheck for proofing.

The Centre also uses teletext, mainly for travel and TV information.

Duncan has a green screen for word processing and a colour monitor "for Prestel's pretty pictures and for student programs".

The original BBC Micro itself and the disc drives removed from their shells are now in a Viglen PC lookalike. "If any one product has to be regarded as my best buy this is it", enthuses Duncan. "I think being able to hold a light, liberated keyboard on my lap and sit at a comfortable distance from the screen is essential.

Abdullah Al-Shahari from Yemen working in his study at the Centre

"The unit also allows me to slide back to the desk where I do the accounts and still use the same computer. Think of the money I've saved!"

A WS2000 modem serves comms requirements, while the original Epson – replaced by a Juki 5510 for sheet fed NLQ mailshotting – now handles program listings, telex and Email printouts, and envelope labels.

A "very efficient" switch allows Duncan to change printers without problem – and without dread memories of recorder leads. "In fact I don't have to go under or behind the computer at all except when software authors force a switch-off before Wordwise Plus will work again", says Duncan.

For the future, he plans to buy a 1200 baud duplex modem – "just to save time on-line" – and maybe a hard disc for the office. "Our accounts are still done manually – there just isn't any BBC Micro time left to do it all", says Duncan. "So when we have sorted ourselves out a bit more I shall start thinking about computerising them".

A Master for the office? Maybe, he says, and perhaps another one or two BBC Micros for the students "Though we'll have to see how next year's bookings look first". The Centre will almost certainly have a network for the students if more BBC Micros are obtained.

After all their initial hard work during this year and the latter part of 1985, Duncan and Rita now have an established and growing business on target for its break even point.

"More by luck than by judgement – and helped a good deal by *The Micro User* – we have managed to avoid making any expensive mistakes", says Duncan.

"But we shall need some expert advice before we go any further.

"However, I'm convinced we would not have been able to set up such a well-equipped Centre and offer such an individual and comprehensive approach to English language teaching had it not been for our BBC Micros, both in the office and in the tutorial rooms".

MicroLink

in association with

TELECOM GOLD

NEWSLETTER

Books and bookmen

BUYING and selling rare and out-of-print books isn't as fusty a business as it may sound – even for a firm founded when Robert Peel was prime minister.

Antiquarian bookseller Wheldon & Wesley has been trading since 1843, but is bang up-to-date when it comes to communications thanks to MicroLink.

Speed is important in locating rare publications, then buying and selling them at the right price.

And as 60 per cent of the firm's business involves dealing with people in countries all over the world, MicroLink's telex and other messaging services are proving invaluable.

"Although we specialise in natural history, we're very willing to search for any rare books other people are looking for", says director Tony Swann, a member of the family which has been running Wheldon & Wesley since the 1920s.

"And where great distances are involved, MicroLink is often the fastest and most economical means of doing the job.

"Our clients are universities, museums and libraries, private collectors and fellow dealers – and two-thirds of them are abroad.

"At present most of our business with the United States is done by telephone, but we should soon have an efficient transatlantic mailbox system via MicroLink – and perhaps even a special interest database as well".

Best foot forward

STOCK control procedures at a fast-expanding chain of footwear specialists in London used to be rather a marathon slog.

Now the system is more like a sprint – thanks to MicroLink.

Cobra Sports Shoe Shops has blossomed into an eight-store chain in as many years, selling to top international athletes as well as spare-time joggers.

It all adds up to a mountain of shoe leather – or rather spikes and rubber.

Before MicroLink, daily stock reports were written by hand and the sheets sent by next available delivery van to the firm's head office, sometimes two or three days later.

Now the information from each shop goes directly every night onto Cobra's MicroLink mailbox for retrieval next morning and processing on the firm's IBM computer. Up-to-the-minute stock control has been achieved without great expense – instead of a micro each store uses a Psion Organiser.

"This gives us simple one-button operations that are easy for the staff to pick up", says Cobra systems manager Daniel Brown.

"And I've successfully written an autodial file-sending procedure in OPL on my Psion which speeds up the process even more".

Link grows

MICROLINK subscribers can now communicate directly with two more countries through the world's biggest electronic mail and messaging network Dialcom.

Italy and Japan have joined the system, bringing to 14 the number of countries offering this global service.

More free software

MICROLINK'S telesoftware library is being reorganised and considerably extended.

The programs run on five types of computer – BBC Micro, Apple, Electron, Atari and Amstrad.

There are now nearly 150 free programs in the MicroLink telesoftware library and this number will be substantially increased during the next few months.

Going with a bang

HAVING survived his childhood hobby of making fireworks – "somewhat luckily", he says – Jon Culverhouse went on to other things.

But he never lost his fascination for colourful explosions and now, with a little help from MicroLink, he's creating them all over the country.

As boss of Fantastic Fireworks, Jon was responsible for something like 65,000 "bangs" around Britain this November 5th.

For the past two years Jon has been selling fireworks imported from places like Germany, Spain – and even China where pyrotechnics originated.

He keeps in touch with his suppliers via MicroLink's telex facilities and uses electronic mail to publicise his services.

These include packaged displays costing from £80 for a family bonfire party to £5,000 for, say, a town's Royal Wedding celebrations.

"I've found that sending information via MicroLink is the most effective method of getting publicity for my company in the media", says Jon.

"My displays have already been featured on Saturday Superstore and Pebble Mill at One as a result".

Fly me...

THE Official Airline Guide database available on MicroLink includes information about nearly 30,000 hotels as well as flight and fare details for more than 750 airlines.

The coverage spans 17,000 hotels and motels in North America, more than 9,000 in Europe and more than 2,500 in the Far East and Pacific area.

Details displayed include the full postal address, telephone and telex numbers, and the range of rates, plus an official classification in most cases.

YOUR chance to join MicroLink – Page 91

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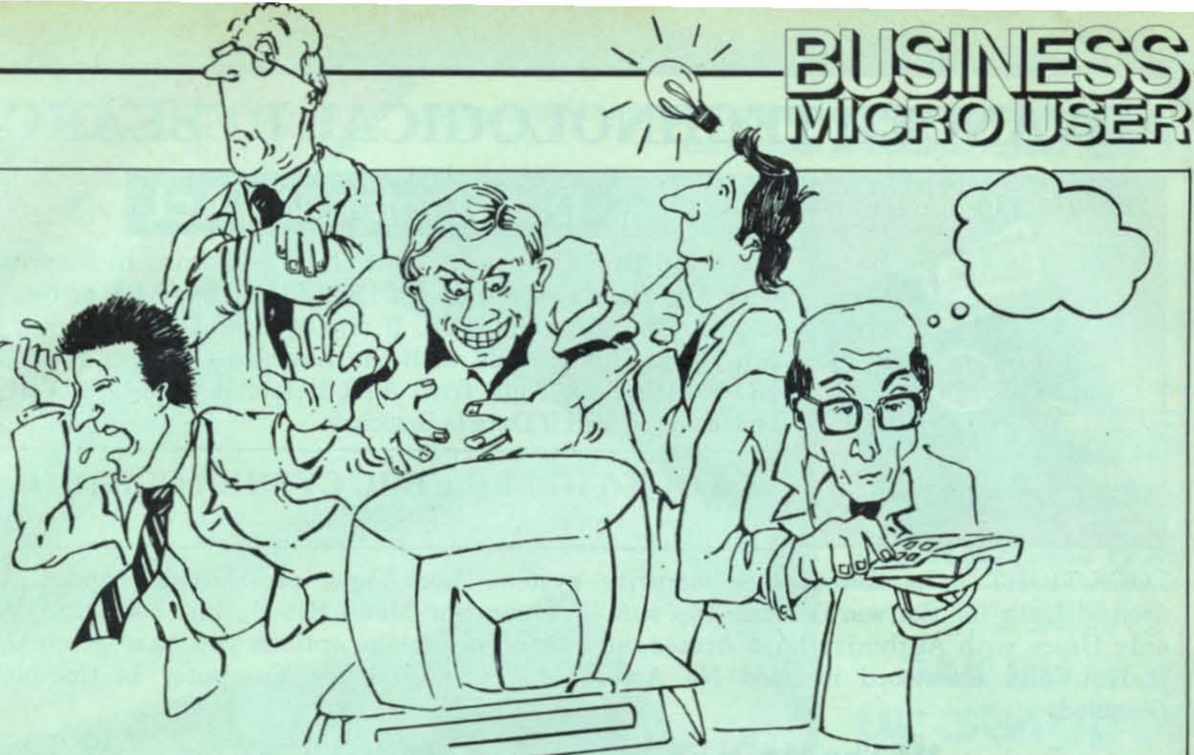

What kind of user are YOU?

JO STORK takes a light-hearted look at stereotypes – and draws some useful conclusions

THE other day I was asked to give a lecture to the directors and senior management of a company with approximately £60 million turnover. Because of the nature of its business it has an unusually large and diverse number of computers. The subject of the lecture itself does not concern us here, nor does the equipment the company uses.

What is of interest is that as usual I asked for a brief background on my audience. The actual question I put to the seminar organiser was, "What sort of users are they?"

Perhaps I had not made my meaning clear since instead of the two line thumb nail sketches I was expecting, (job title, age, computer experience), on each of the 22 members in my audience I received virtually complete curriculum vitae.

These set me thinking, because there were five clearly defined groups with a couple of minor sub-classifications, all of which would have quite differing requirements.

The more I thought about my audience, the more I realised that the same classifications are universal for any computer users. This has nothing whatsoever to do with experience or knowledge, but is solely down to the way a person operates.

Readers of *The Micro User* would therefore be well advised to identify the group they belong in, for the kind of user they are will govern their style of working and hence the efficiency or otherwise of their eventual system.

The classifications below are in no particular order and the names I have given them are my own.

The Fidgets

These are the sort of people who are totally incapable of finishing a system. Alternatively, if they have a ready made system obtained from some other source, they are equally incapable of leaving well alone. Examine their disc files and you will find a mass of half-finished routines and modules. The reason for this style of working is quite simple. They constantly have ideas of the, "Wouldn't it be nice if..." variety and immediately start to work on them. It is of no importance to them if the previous piece of work is not yet finished.

These people are potentially extremely dangerous since they are frequently highly capable and knowledgable in computing matters. Consequently, less aware persons are very likely to ask them to produce systems. The outcome is that when the deadline for the system has long since passed and the requestor is jumping up and down like a demented pogo-stick in a desperate attempt to get even part of it delivered, Fidgets will stay up all night to produce a half-baked pilot version without documentation.

Since the system is clearly unsatisfactory they then proceed to adjust, tune, enhance and generally titivate it. Even so only a very small number of the modifications required to make the system meet its original specification are ever produced. Nevertheless by then the coding has taken on the appearance of the classic rat's nest.

Newcomers can also become Fidgets, since as they learn more they discover better ways of carrying out the same task. This tempts them to adopt the newly acquired knowledge. During this early stage of

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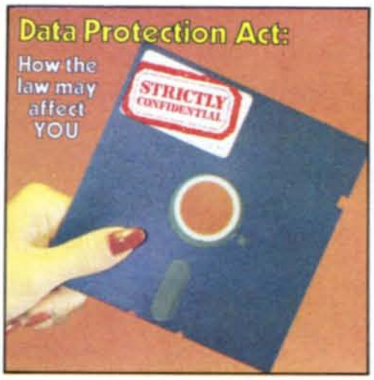

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computing development they are naturally forever discovering newer and better ways of performing some task with the consequence that they do not complete any.

The Magnates

Repeatedly, when I was still only 30 years old the Magnates would argue along the lines of, "How can a young whipper-snapper like you know?" or alternatively, "I was doing ... when you were still chewing rusks." Now that I am considerably older they are still making my life difficult. The reason is that these types are traditionally workaholic self-made men who developed their organisations on their own.

The problem is that they are now almost incapable of taking any advice, since their maxim is, "No-one can tell us anything new about our business." If they believe they need a Gizzmo 256k then it is no use suggesting they require a Wonderbyte 512. If you tell them they should not put their payroll on to a computer and they think otherwise, be prepared for them to dump you for someone who will install payroll on the Gizzmo.

In fairness to them, if you do get the Magnates to agree to something, they throw the full force of their considerable personality behind the project and drive it for you. When this happens be prepared to rein in their gung-ho enthusiasm. Before you can say, "Bit!", they will be asking you if you can do this, add that or produce the other. Because of the personality you are matched against it is not easy to turn down the requests, since the Magnates will still expect the original time-scale to be adhered to. If you agree to all their requests and do not adjust the project time-table, you are in grave danger of being forced to become a Fidget.

Nonetheless if you can stand up to the bluster and come to some working relationship, working with a Magnate can be a highly satisfying experience resulting in rapid completion of many fine systems.

The Neurotics

These know that the time is long gone since they needed to computerise their organisation, but having heard all the war stories of the saloon bar experts, they are fearful as to whether they will ever handle the silicon monster or cope with the changes it will bring. They keep putting off the evil day, rationalising that they need to study further what systems are available. Only if the present system is dead on its feet will they actually take the plunge.

They share something with the Magnates, since they also resent the "young upstart" they have to work with. This time it is not a superiority complex but fear that their position will be undermined. They worry that their technological inadequacies will become widely known within the organisation and jeopardise any further advancement within it.

Neurotics frequently appear to be interested and knowledgeable in data processing, which can prove highly misleading to the unwary. Look in their desks and you will find a large number of system proposals, advertising literature, brochures from exhibitions and the like plus in many cases their reports on the same. The latter all give "valid reasons" why the organisation they work for is unique and nothing suitable and cost-effective is available on the market.

Neurotics are always interesting people to work with. They usually have all the capabilities needed and only lack the confidence to use them. I have met people who can calculate the stresses on a major bridge using only a slide-rule and the back of an envelope, but who quail at the thought of using a standard computer program to do the same thing in a tenth of the time. Similarly I have met people who can add lengthy columns of figures with complete accuracy in far less time than an able operator can enter them at a keyboard. They consequently resist on the basis that there is a greater likelihood of data being input incorrectly than there is of their getting the mental arithmetic wrong.

If Neurotics maintain their positions long enough they can become very well informed about all aspects of configuration, specification, analysis and design. Studying all the tenders and writing the reports gives them a feeling of great confidence and they are therefore often regarded as the fount of all knowledge by their peers. What is more, they can claim in absolute truth that they have never made a mistake. How could they? After all they never took a decision.

The Technocrats

These types are the virtual opposite of the Neurotics. Their attitude is, "If it's new it must be good." They are first cousins to the Collectors, whose principle is, "If it's new we must have it", and half-brothers of the Tsars whose maxim is "If it's bigger it must be better."

The problem they cause is that all three are for ever throwing out the commercial baby with the cybernetic bathwater. No sooner is a system working properly, the operators and staff familiar with its functions and the results starting to pour from it than they get restless, believing it must be out of date and need replacing. If a system has a life-expectancy of five years, they are looking to change it within two.

To the battle-cry of "We can't let the competition get the jump on us!", all three disrupt the organisation's work with more surveys, feasibility studies, progress meetings and training courses. They too acquire drawers full of brochures, reports, course documentation and so on, but unlike the Neurotics, installation does occur. The clue to their thinking is plain to see on top of their desks. They were the first members of their Chamber of Commerce to use a mouse, Email, have hard discs, fit all the go-faster chippery and use multi-colour high-resolution graphics. Alongside the terminal on their desk you will also find the most modern telephone handset, op-art desk ornamentation and other executive toys.

Technocrats do have a one massive virtue. If you are a youngster starting in the computing industry, then try and find yourself a manager who is in this group. You may well feel harrassed by the constant chopping and changing but you will learn faster than in any other

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environment. Technocrats will take you to the forefront of computing and make sure you stay there. You will gain skills at a rate which will accelerate your career in fine style.

The Accountants

Do not confuse these with the Neurotics. They are unnaturally reluctant to take decisions because they will not make any move until every single cost and benefit has been calculated to a considerable number of decimal places. As the proposals arrive, every penny of the charges is analysed and each claimed benefit is considered. Queries and replies flow back and forth as the Accountants endeavour to determine if the magic cost benefit ratio of 1:1.5 has been reached.

At least a decision can eventually be made. If, after studying the mathematical entrails, the figures read right then the proposal is usually accepted. Unfortunately whether the system even works is a secondary factor, always assuming it is even considered. The omissions in many proposals are as informative as the inclusions. The Accountants more than any others are likely to have overlooked something fundamental such as whether the double micro system chosen can share files.

The money aspects of a system are naturally vital, but many of the factors are hard to quantify, such as the benefit gained from sending invoices out sooner versus the cost of decreased staff efficiency during the period of familiarisation. Nevertheless the Accountants will try. At the same time, if there is an element of the wheeler-dealer in the user, they will start to haggle over discounts and so forth. This is marvellous in principle until another basic issue such as user-friendliness is ignored. The Accountants show little interest in topics such as these, since they are the last to sully their lily-white hands by touching a keyboard, flowcharting template or coding sheet.

A further by-product of this thinking is that almost invariably the information which the chosen system presents will be financial. They find it very easy to overlook the possibilities of using others for such things as Computer Aided Design (CAD). I well remember a client in light engineering who called me in after the retirement of one of this group. The financial system would have done credit to a clearing bank, but the production and design side of the business was being handled with techniques which would have seemed antique to Noah building his ark.

Now that we have looked at these stereotypes, I hope you will recognise yourself in at least one of them. I have purposely chosen extremes in my descriptions, but there should have been sufficient indication for you to know what your attitude to data processing is. I stress that I fully accept that it is impossible to change your personality once past a certain age. Consequently I hope that what follows will be regarded as harnessing the advantages which your stereotype brings to computing, rather than trying to make you act in a manner wholly foreign to your natural style.

To the Fidgets, might I suggest that they regard the project time-table as the be-all and end-all of their task. By all means they should use completed and fully tested versions of their half-written modules, if they can be incorporated in the system. Develop more if they need to, since I do not wish to deprive them of all their fun. Nonetheless they should try to integrate all the various bits and pieces into just one worthwhile system. As a guideline I would suggest that no further un-related activities be entered into once 50 per cent of the project time-scale has passed.

The Magnates would do well to think about the days when they were new at their trade. They did not get where they were without seeking and using advice in their early days. If you are the Magnate type then consider the following. Just because you are a master of one skill it is unrealistic to assume that you are as expert in others, such as data processing. Remember that even the experts are still learning about a fast moving field therefore set your many talents to searching out the best advice you can get, in the same way as you did in the past.

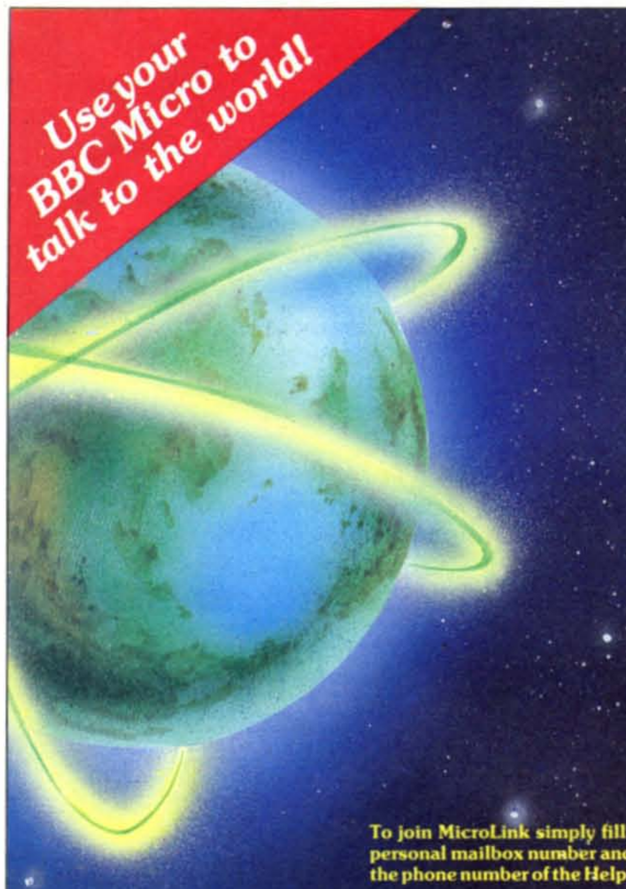
Of all five groups, the Neurotics have the greatest internal conflicts to overcome. An organisation needs stability and direction, therefore sometimes the best decision is to take no decision at all. Nevertheless when acting becomes inevitable, delay is totally counter-productive. If you believe that the task is beyond you then give up responsibility for it and hand it over to someone who can handle it. If your organisation is large enough, what is so wrong with passing it to another member of staff? As a manager I was far happier to have juniors express their doubts rather than have them keep their concerns to themselves and then produce a pig's ear. If you have insufficient staff then give the problem to someone who can provide you with a turnkey system.

To the Technocrats the problem is an easy one. Just start working out a Cost : Benefit ratio of what you plan to do. If you discover it does not come to 1:1.5 and can not control your excessive zeal, then you are a lost cause. If the ratio is on the right side, be happy. Enjoy life, safe in the knowledge that you can purchase your new toy and still show a profit.

Finally I come to the Accountants. If you are one of these, then might I suggest that you try and split your time into three equal portions. The two new ones for you are analysing the system design and assessing new uses to which computer equipment may be put. When you get twitchy about carrying out such excessively radical activities, you can always return to your beloved costings.

I may have taken a light-hearted look at your working style, but it should now be obvious that each type has much to offer the other. If only it were possible, I would like nothing more than to operate on Mondays as a Fidget, on Tuesday as a Magnate and so on through the week finishing on Friday as an Accountant – working in this fashion I would reap the benefits of each.

If you do not recognise yourself in any of the above, then please write and tell me how such perfection was achieved. With such a paragon for competition I will concede you are my superior, bow down before such a master and happily hand over this column to you. ■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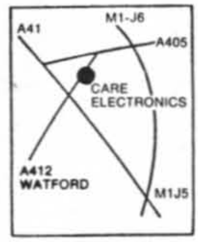

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Shift and Control on red alert

In Part 8 of his series on spreadsheets NIGEL PETERS continues his exploration of the function keys used in Mini Office II

LAST month we explored some of the red function keys and saw the effect they had on our Mini Office II spreadsheets. This time we'll continue our journey, looking at the results of combining these keys with Shift and Control.

We ignored two of the keys last month, *f4* and *f7*. We'll continue to ignore *f4* for the moment and see what *f7* does, which is to allow you to correct your errors.

Have you ever made a mistake when you've been typing in one of the example spreadsheets? It can be really frustrating when you enter a number in a cell and then realise that you've put it in the wrong one. Of course there's no problem about putting the number in the correct cell but what about the cell where you made the mistake? This probably contained something and owing to your carelessness it's gone, overwritten, lost. It's so frustrating.

Happily it's gone but not forgotten. So long as you haven't made another cell active and entered something, pressing *f7* will bring back the value you've carelessly overwritten. It gives fallible people like you and me a second chance to get things right.

Of course it would be nice to have avoided the mistake in the first place and spreadsheets have an error avoidance method, that of locking cells. To explore this, try entering the spreadsheet shown in Figure I. Cells A1 and B1 are labels, while cells A2 and B2 hold the values 1 and 2 respectively. The rest of column A just increases the value of the cell above by 1, while in column B the previous cell is multiplied by 2.

It's an obvious case for the application of formulae and relative copying. I'll leave you to figure out how to do it and just point out that the whole thing shows the value of the powers of 2 from 1 to 5. (2 to the power 2 is 2*2, 2 to the power 3 is 2*2*2 and so on.)

Once you've got the spreadsheet on your micro, let's have a go at protecting it from accidental damage.

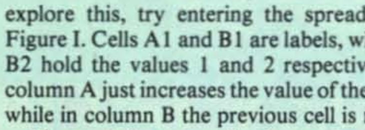
Suppose that you decided that the value 2.00 in cell A3 was so important you didn't want to change it inadvertantly. What you do is to make A3 the active cell and then press the Shift and *f0* keys at the same time. This "locks" cell A3 as is shown by:

```
(LOCKED)
```

appearing in the status area. Now try as you like, you can't enter anything into A3. If you do you just get a rather nasty beep and another message:

```
Locked
```

in case you missed the first one!



```
.......A.......B.......C.......D
1  Power  2 to P
2    1.00    2.00
3    2.00    4.00
4    3.00    8.00
5    4.00   16.00
6    5.00   32.00
7
8
```

Figure I: Entering initial data

Of course, human beings being the fickle brutes that we are, we're bound to change our mind and want to put something in A3 after we've locked it. So we need a way to unlock the cell and this is done by making A3 active and then pressing Control and *f0* simultaneously. We can now enter new data. While it may seem a bit silly to be able to undo our locking so easily, the fact that we have to do it does act as a brake, making sure that we think before we overwrite a cell's contents.

Often we don't just want to protect just one cell, we want to lock a whole column or row of cells. This can be done using two more of the function keys.

Say we wanted to lock column A of our spreadsheet. All we do is move the cursor to any cell in column A and then press Shift + *f1*. The result is that all the cells in that column are locked. You'll see this if you move the cursor up and down the column, the status area solemnly telling you that each cell is locked. If you don't believe it try entering a value into, say, A5 and see what you get for your pains.

Similarly you can lock a whole row. You just make one of the cells in that row active and then press Shift + *f2*. The result is that all the cells in the row containing the active cell are locked.

And when you want to change your mind and alter cells in a locked row or column, you're allowed to unlock them. Pressing Control + *f1* lets you tamper with a previously-locked column, Control + *f2* with a row.

Now we come to the *f4* key we ignored earlier. By now you're probably used to the ripple effect you get when you change a number in a cell. Suppose you changed B2 in our spreadsheet to 3 – assuming that it's

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From Page 93

unlocked. I doubt if it will shock you to see that the other values in column B also change. We're used to this automatic updating of the spreadsheet. However we don't always want this, at times we want to change values without having consequences all over the place.

This automatic update is the default condition of the spreadsheet, the condition that applies at the start. In fact that's what the:

```
Auto
```

in the status area has been trying to tell us. Now we can switch this off by pressing Shift + *f4*. A glance at the status area shows us that we've done this, the message now being:

```
Manual
```

Confirm this by putting another value in B2, say 4. You'll see that the auto-update no longer occurs. There's no ripple through effect, the rest of the values in the column remain stubbornly the same even though they're all interlinked by formulae.

Once again the spreadsheet program allows us to change our mind and we can force an update, even when in manual mode. This is done using our previously neglected *f4* key. Press this and you'll see the spreadsheet change as the various formulae take account of the avalanche of new values started by changing B2.

And when you decide to switch on the automatic updating again, all you have to do is press Shift + *f4* again. This toggles between automatic and manual modes.

While we're using the *f4* function key, let's see what pressing Control + *f4* does. When you do this you'll see the message:

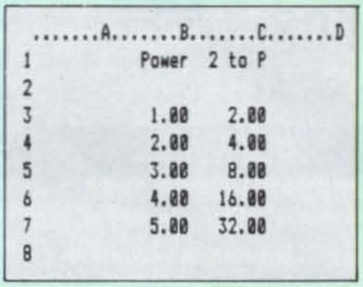
```
Enter column size:
```

appear in that status area. From this you should guess that pressing Control + *f4* allows us to change the width of our column. Now we've already been able to do this from the spreadsheet's menus so you may think that this is a bit wasteful. However, Control + *f4* only applies to one column, that containing the active cell. Previously we've only been able to change the width of all the columns.

So if the active cell is in column B, say B4, by replying 2 to the prompt and pressing Return you get a column B two characters wide. And as before you don't lose any information. All the contents you've previously put in the cell may not appear on-screen, but they are still there. If you don't believe me try using Control + *f4* again and this time request a column width of 7. All the old information re-appears.

By now your spreadsheet probably looks nothing like Figure I but unless you've gone really wild they will have one thing in common. They will be quite cramped. To look at Figure I, you can see that it's all numbers and labels. It would be much better if there were a few gaps in it. This would not only make it look better but it can also help understanding of the spreadsheet by isolating similar groups of cells.

Of course I've always harped on about planning and you should really have the layout sorted out before you start entering values. However, that's the counsel of perfection and we all change our minds. And, happily, spreadsheets usually allow for this. With Mini Office II the remedy lies in the *f3* key. Pressing Shift + *f3* allows us to insert a blank row or column into the spreadsheet. Let's try it on the spreadsheet in Figure I and see what happens.



```
.......A.......B.......C.......D
1         Power  2 to P
2
3          1.00    2.00
4          2.00    4.00
5          3.00    8.00
6          4.00   16.00
7          5.00   32.00
8
```

Figure II: The extra row and column

It would be nice to have a blank row between the labels and the figures, so let's do this. First move the cursor to any cell in row 2. Now pressing Shift + *f3* results in the message:

```
Insert row/column (R/C):
```

appearing in the status area. And replying with R for row gives us a blank row, the row containing the previously active cell and any subsequent rows all being moved down one to make room.

In pursuit of a neater layout we might also want to have the first column blank. This is done by making a cell in column A active and then using Shift + *f3* and replying C to the prompt. Column A is now blank with all the other columns being moved to the right to make space for it. The result should be something like Figure II – the figures may be different depending on what you've done previously.

Notice that no information is lost, it's just shuffled to the right or down to make room. And the blank row or column is always inserted where the active cell is.

And of course now we've got this facility to add a row or column to a spreadsheet we'll also want to be able to delete it. No prizes for guessing that this is done with Control + *f3*.

As before we move the cursor to the row or column we want to deal with. Pressing Control + *f3* results in the prompt:

```
Delete row/column (R/C):
```

and replying R or C deletes that row or column as required.

Knowing this it should be no trouble to re-create the spreadsheet of Figure I from Figure II's spreadsheet. Be wary though! Whereas adding a column or row doesn't lose information from the spreadsheet, deleting does. Delete column C of Figure II and it's gone for good. Hence it's always wise to lock columns and rows and so avoid tragedies.

● *And one more tragedy is that this is where we end for this month. More next time as we finish our exploration of the function keys.*

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A panacea for poor spellers

JIM NOTMAN looks into Acornsoft's much awaited ViewSpell, and gives it a definite thumbs up

ACORNSOFT has long promised a spelling checker for its View word processor. It has finally arrived with a package consisting of an 8k eprom, 80 track disc with the master dictionary, 41 page user guide and a reference card.

The package seems rather complicated at first, but is really straightforward. The reference card has a diagram showing which commands can be performed and in what order.

Once the software has been initialised in familiar View fashion with *SPELL the screen displays in the top left hand corner the title, number of bytes free, source file, number of words present and the current screen mode.

To check some text you first need to load it into memory. ViewSpell will then make a list of all the unique words, giving you the total word count and how many unique words there are in the file. As the list is being compiled any upper case letters are converted to lower case.

This can take some time, so to show that something is still happening a series of dots are printed on the screen. Once compiled the list is then checked against the master dictionary. This again takes some time, to the accompaniment of more dots.

The dictionary is larger than any other supplied with a spell checker. It fills most of an 80 track disc with a 175k file of 74,099 words stored in a compacted form, which apart from compressing the file also makes it easier and quicker to check.

ADD	Add selected words to a user dictionary, from a list in memory.
AW	Add words (typed in from the keyboard) to a user dictionary.
CHECK	Checks words against the dictionaries.
CMARK	Makes a text file with unfound words marked – on a single disc drive.
CONTEXT	Shows unfound words in the context of the original file.
CREATE	Creates a user dictionary.
DW	Deletes words from a user dictionary.
LIST	Lists the words in memory.
LOAD	Loads a text file retaining only a list of unique words.
MARK	Makes a text file with unfound words marked.
MARKER	Changes the characters used as markers.
MODE	Sets the screen mode.
NAME	Changes the source filename.
NEW	Clears all words but leaves prefixes and current user dictionary.
PREFIX	Specifies drives and directories for dictionaries and text files.
READ	Reads in words from other text files.
SAVE	Saves the word list to disc.
SCREEN	Displays the original text file.
SEARCH	Locates and displays words from the dictionary.
USER	Specifies a current user dictionary.

Table I: Viewspell commands

Although this sounds like a huge number remember that each one may have a number of closely related words with different endings. For example, with the word yacht there is also yachting and yachts, but no yachtsman.

The words, supplied by Longman and based on its Concise English Dictionary, provide a wide ranging vocabulary. As you might expect there are a number of computing words present including byte and microcomputer. However there was no rom or eprom.

Crossword and Scrabble addicts will really like the facility to scan through the directory to look for the word they want. This task is helped by wildcards. All the words in the dictionary can be displayed or printed out with SEARCH *, where the star stands for any sequence of letters.

The ? character will stand for any single letter. For example, SEARCH *ing will display all words ending in "ing" and SEARCH ?a? will display all three letter words which have "a" as the middle letter.

Once the words from the original text list have been checked only those that have not been found in the dictionary remain. The checked list may be displayed on the screen or the words may be displayed in the context of the original text.

More usefully another file can be produced in which all the words not found by the dictionary are marked so that they may be easily found and edited in View.

By default the marker is !, but this may be changed. A marker may also be placed after the word. It is possible to change the markers to highlight characters so that, for example, all the marked text is underlined when printed out.

Just because a word is not in the master dictionary

→

From Page 97

does not necessarily mean that it is incorrectly spelt. It could be an abbreviation, proper noun, word with an apostrophe or a specialist term.

Words that you use often, but are not in the master dictionary may be put into user dictionaries. Words may be added from the list of unfound words or typed directly into the dictionary.

Before they are added they are checked to see if they are already included. Words may be up to 32 characters long and the user dictionary up to 130,000 bytes long. Unwanted words can be deleted from the dictionary.

The PREFIX command tells ViewSpell on which drives the text and dictionaries are, and the USER command names of any user dictionaries. It is possible to set up a *EXEC file to enter ViewSpell, load and check text, produce marked text, then switch into View and start searching for the markers.

Although designed for View, ViewSpell can also be used with other word processors such as Wordwise and Mini Office II. Usually text files from word processors contain embedded control codes which could confuse ViewSpell. Therefore an Ascii file should be spooled for checking.

I did come across one problem with a couple of my View files which caused the system to crash when producing a marked text file.

This seemed to be due to three highlight characters appearing together for bold printing because when they were removed – and only these – there was no problem. The strange thing was that it then worked with other files with similar highlight commands.

This is the most flexible and easy to use spell checker I've come across so far. The documentation is up to Acornsoft's high standard with a 41 page manual. It is clearly illustrated using the example file supplied on the disc. My only quibble is this package has taken so long to appear. The only danger with ViewSpell is that once you start using it you'll find that you can't do without it. ■

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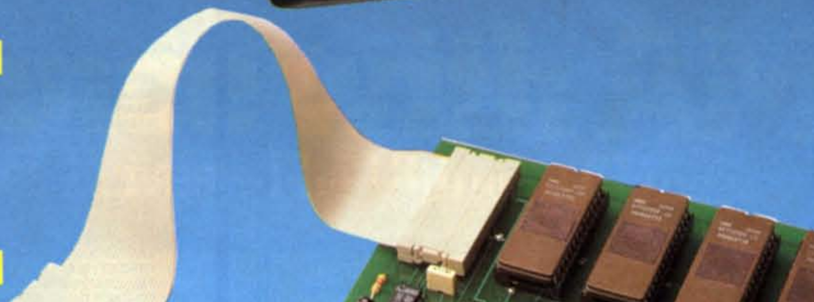

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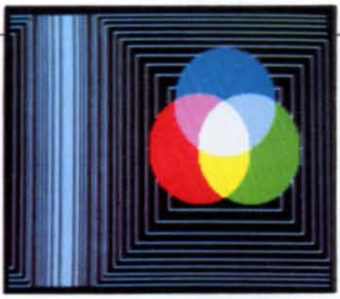

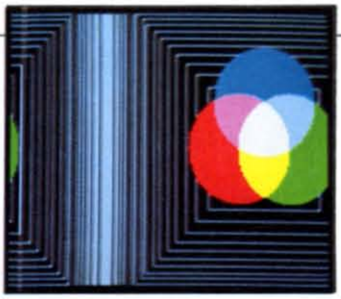

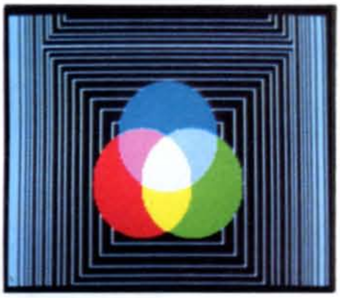

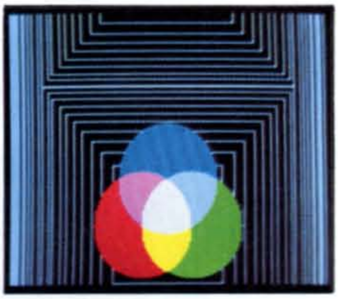

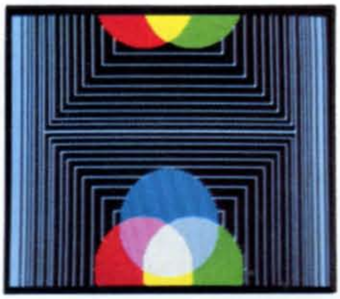

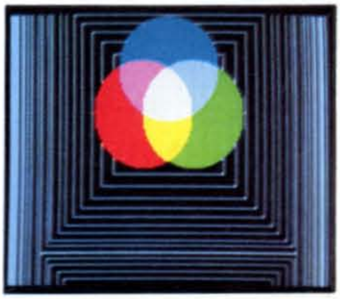

Four-way SCROLLER

ONE of the great programming mysteries of the BBC Micro must be that of sideways scrolling. Yes, I know it's a simple matter of altering registers 12 and 13 of the 6845 CRTC, but it isn't as simple to prevent the jumping that occurs in doing so.

After a little bit of typing and a lot of thinking I came up with this program to scroll a Mode 2 screen in any direction without jumping.

If you are unsure how the 6845 can be used to scroll the screen, it is explained by Alan Plume in the August 1984 edition of *The Micro User*. However you don't need to understand how this program works to find its fast machine code routines useful within your own programs.

By TIM BROWN

Type in the program carefully and save it before you run it, or you might find that it could be lost due to a typing error. Take special care when typing in the variables ending with *lo* or *hi*, as getting one of these wrong can prevent the program from working properly.

When you run the program a simple picture will be drawn on the screen and a beep will be heard. At this point press Z, X, *, or ? to scroll in the appropriate direction. Press space to exit the program.

At the core of the program are four routines, *Right; Left; Up* and *Down*. Calling any of these will scroll the screen in that direction.

The routine *setup* must be called before any scrolling takes place and to use the routines in your own programs you must call *setup* once then *Right*, for example, any time you want to scroll. If you are in Basic use CALL or from machine code JSR.

Now for something flash, or rather to get rid of it. Type the following lines into your program:

```
  75 FOR C=8 TO 15:VDU19,C,0;0;:NEXT
 495 EOR#&C0
 625 EOR#&C0
1115 EOR#&C0
1245 EOR#&C0
2420 GCOLK,9
2440 GCOLK,10
2460 GCOLK,12
```

You now have a routine that shows two Mode 2 pictures on the screen at once. One picture is drawn in colours 0-7, the other in colours in 8-15.

Lines 495, 625, 1115 and 1245 swap the colours around. Line 75 simply sets the flashing colours all to black. When the sideways routines are called one line of the other picture is revealed.

Be careful when printing or plotting on the screen after scrolling, the effects can be unusual. The program works on all BBC Micros with 32k though on the B+ and Master the shadow mode should not be used, and the Tube should be disconnected.

Well that just about wraps it up (or around) for scrolling. With some clever use of colours as in the amended program a useful advertising display could be created, or a kind of slide show is possible. It is simply a matter of drawing the picture right.

Full listing starts on Page 131

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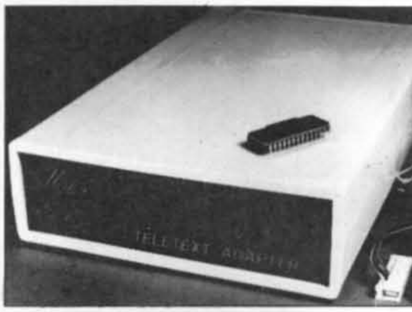

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Christmas BOX

By ROLAND WADDILOVE

IT is Christmas Eve and the presents are under the tree. To while away the time everyone is trying to guess what they are going to receive.

There are seven different types of present and five boxes under the tree. What you have to do is guess what is in each box.

You can have up to 12 guesses and your guess will be marked using black and white pegs:

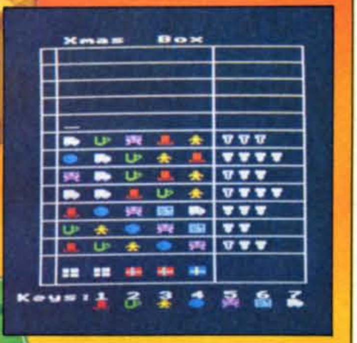
- A black peg means that one of the five presents in your guess is correct and in the right place.
- A white peg means that one of the presents is correct but in the wrong place.

The pegs are not awarded in any particular order, so you can't tell which peg is for which present.

There are four levels of difficulty to choose from and this quite addictive game is for the whole family.

The controls are simple: Press a number, 1 to 7, to place a present and Delete to erase it.

Christmas Box will stretch your powers of logic to the limit and is just the job for those long winter evenings. It's a real brain teaser! ■



Xmas Box

Keys: 1 2 3 4 5 6 7

PROCEDURES

board	Set up the screen.
variables	Set the difficulty level.
input	Input your guess.
check	Mark your guess.
initialise	Define the characters.
instructions	Print the instructions.

VARIABLES

guesses	The number of guesses taken.
code(5)	The answer.
guess(5)	Your guess.
level	Difficulty level.
correct	The number of presents correct.

Full listing starts on Page 139

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And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

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DATABASE SOFTWARE

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Carry the flag to good effect

AS promised, this month we're going to meet a new flag – the Carry flag. It's intimately involved with addition and subtraction which, when you consider that the 6502 sees all its data as numbers, means that Carry is rather vital to machine code programming.

In fact it's so important that the Carry flag is included with the mnemonics for doing sums. Addition is implemented as ADd with Carry (ADC) while subtraction is SuBtract with Carry (SBC). You can't do sums without having Carry in there.

Carry itself is our normal two-valued flag. It can be *set* – when it has the value one – or *clear* – when it has the value zero. As with the zero flag, there are two relative branch instructions based on it:

BCS Branch if Carry Set
BCC Branch if Carry Clear

There are also two instructions that allow us to fix the value of Carry directly:

SEC SEt Carry
CLC CLear Carry

Most of the time we'll be branching as a result of how a particular operation has affected Carry.

Fundamentally, the Carry flag warns us that the sum we're doing is going to give us a misleading result. These misleading results stem from the fact that, as we've seen, the accumulator can only handle numbers in the range 0 to 255 (&FF).

Suppose that the accumulator already has &FF in it. Adding one to it should give us &100 (256) but this is too large for the accumulator, which "wraps round" to zero – exactly 256 out!

Again, if we were to add 2 to &FF, the result in our accumulator would be one. Once more we're 256 out. Think of the sum as:

$$\begin{aligned} &255+2\\ =&255+1+1\\ =&256+1\\ =&1 \end{aligned}$$

What happens can be described by the following rule: When you get to a 256 in a sum, discard it!

It's as bad for subtraction. We're used to the fact that 1–2 gives us &FF. One way to think of this is, when the number we're taking away is "too big", we add an extra 256 into our sums to get them to work. The sum above becomes:

$$\begin{aligned} &1-2\\ =&256+1-2\\ =&256+1-1-1\\ =&256-1\\ =&255 \end{aligned}$$

The size restriction on the number a byte can handle causes us immense problems. Obviously we need to take its effect into account when we do our sums, otherwise we'd get too many wrong answers. We need something to indicate that we've over-reached the confines of our accumulator. This is the purpose of the Carry flag.

By MIKE BIBBY

Let's have a look at this in practice: To add, say, 6 to 8 we would need something like:

```
LDA #6
ADD #8
```

The answer ends up in the accumulator.

Notice that we're using immediate addressing: We're not talking about the *contents* of memory locations 6 and 8 (as we would be with absolute addressing), we mean the actual values 6 and 8.

Unfortunately there isn't a straightforward ADD instruction on the 6502. You have to use ADC – ADd with Carry. This does an add, all right, but includes the value of the Carry flag in the sum. The previous instructions would translate into:

```
LDA #6
ADC #8
```

The trouble is this sum can give two answers, depending on whether Carry is set or not. If it is set, it becomes:

$$6+8+1=15$$

If Carry's clear it is:

$$6+8+0=14$$

Obviously it's the second option we want, and to make sure we get it, we use CLC first to ensure that Carry is clear as in:

```
CLC
LDA #6
ADC #8
```

You might be wondering why we bother including Carry in our add instruction at all, since all we've done is

→

```
   10 REM PROGRAM I
   20 first=&70
   30 second=&71
   40 result=&72
   50 add=&900
   60 REM *** Machine Code core ***
   70 FOR pass%=0 TO 3 STEP 3
   80 P%=add
   90 [
  100 OPT pass%
  110 CLC
  120 LDA first
  130 ADC second
  140 STA result
  150 RTS
  160 ]
  170 NEXT pass%
  180 REM *** Basic surround ***
  190 REPEAT
  200 REPEAT:INPUT '"First Number",nu
mber1%:UNTIL number1%>-1 AND number1%
<256
  210 ?first=number1%
  220 REPEAT:INPUT '"Second Number",n
umber2%:UNTIL number2%>-1 AND number2
%<256
  230 ?second=number2%
  240 CALL add
  250 PRINT 'number1%;" + ";number2%;
" = ";?result''
  260 UNTIL 0
```

Program I

From Page 107

to set it to zero so it has no effect. The answer is that we need it to handle sums involving large numbers, as we'll see later in the series.

For the moment, take a look at Program I. It might look rather complex at first, but most of it is a Basic surround for a simple machine code program:

```
CLC
LDA first
ADC second
STA result
RTS
```

The assembly routine adds the value in memory location *second* to the value in *first* and stores the answer in *result* – all three of which are safe, zero page locations. Notice that we've cleared Carry initially.

Once the code's assembled – at *add*, set to &900 – we input the values for *first* and *second* and poke them into memory (lines 200 to 230). We then call our assembled machine code with line 240 and print out the sum, complete with answer, with line 250. Notice how we use *?result* to recover our result from memory location &72.

Following what's going on here should give you no particular problem. Try it out with simple sums such as:

2+3
45+23
36+78

So long as the answer to the sum doesn't exceed 256 the answer will be correct. However, go past this and you're in trouble, as you'll see from trying:

255+2

You'll get the answer 1: Since we've exceeded the confines of the byte, we wrap round again.

Although in cases like this we can spot what's going on, in more complex machine code programs we have to anticipate these problems and take avoiding action.

This is what Carry is for: If the result of our ADC instruction takes us over our 255 limit this flag is automatically set to warn us of problems. If, however, all's clear, the Carry flag itself is cleared.

Either way, the Zero flag is changed to reflect whether we're in limits or not.

Armed with this knowledge we can use our BCS and BCC instructions to take remedial action when required.

```
   10 REM PROGRAM II
   20 first=&70
   30 second=&71
   40 result=&72
   50 carry=&73
   60 add=&900
   70 REM *** Machine Code core ***
   80 FOR pass%=0 TO 3 STEP 3
   90 P%=add
  100 [
  110 OPT pass%
  120 LDA # 0
  130 STA carry
  140 CLC
  150 LDA first
  160 ADC second
  170 STA result
  180 BCC noerror
  190 LDA #1
  200 STA carry
  210 .noerror RTS
  220 ]
  230 NEXT pass%
  240 REM *** Basic surround ***
  250 REPEAT
  260 REPEAT:INPUT '"First Number",nu
mber1%:UNTIL number1%>-1 AND number1%
<256
  270 ?first=number1%
  280 REPEAT:INPUT '"Second Number",n
umber2%:UNTIL number2%>-1 AND number2
%<256
  290 ?second=number2%
  300 CALL add
  310 PRINT 'number1%;" + ";number2%;
" = ";?result+256*?carry'
  320 UNTIL 0
```

Program II

Program II shows one way of doing this. What I'm doing is to use a zero-page location – called, appropriately, *carry* – to reflect the state of our Carry flag. First of all we set it to zero with:

```
LDA #0
STA carry
```

Having done that we do our sum as before:

```
LDA first
ADC second
STA result
```

It's the next lines that are interesting. We know that ADC affects the Carry flag. If we've not over-spilled our byte, Carry will be clear and no corrective action is required. We cater for this with the next instruction:

```
BCC noerror
```

This simply takes us to our RTS, which is fine – we've done all we need to do. In addition, since we haven't done anything to change it since we made it zero, *carry* holds the same value as the true Carry flag – zero.

On the other hand, if we have gone over 255, our answer – held in *result* – is going to be 256 out. Fortunately, Carry is set to warn us. In this case we do not take the branch at the BCC but continue with the next instructions:

```
LDA #1
STA carry
```

This alters the contents *carry* to reflect the new value of our Carry flag – one. The next instruction then takes us to the final RTS.

When you think about it, our machine code routine gives the same number in *result* as that of Program I. The difference is that this time we also store some additional information in *carry* – whether the Carry flag is set or not.

Our Basic "tail" then takes care of things. Line 310 prints out our sum, calculating our answer as:

```
?result+256*?carry
```

Think about it:

When Carry is clear (so *carry* contains zero), our answer is simply the value in *result*. The formula above boils down to:

```
?result+256*0
```

which gives us what we require.

When Carry is set (so *carry* holds 1), our answer needs 256 adding to it. Again, the formula above takes care of things, becoming

```
?result+256
```

And that's all there is to it. In practice we wouldn't leave our corrective routines to Basic, but write them in machine code. The principle's the same though: By watching Carry, we can take appropriate action.

I'd also better make explicit something that I've taken for granted: Load and store instructions don't affect the Carry flag.

It probably hasn't occurred to you that they might, but now I've mentioned the possibility, have a look at the two routines and see how they would be affected. Then breathe a sigh of relief that you can ignore the problem!

● *We'll look at more elegant solutions to large numbers later in the series. Before that though, in next month's article we'll take a look at subtraction in machine code. If you'd like to play around with ADC in the meantime, you might like to know that ADC# allows you to add "constants" in immediate mode . . .*

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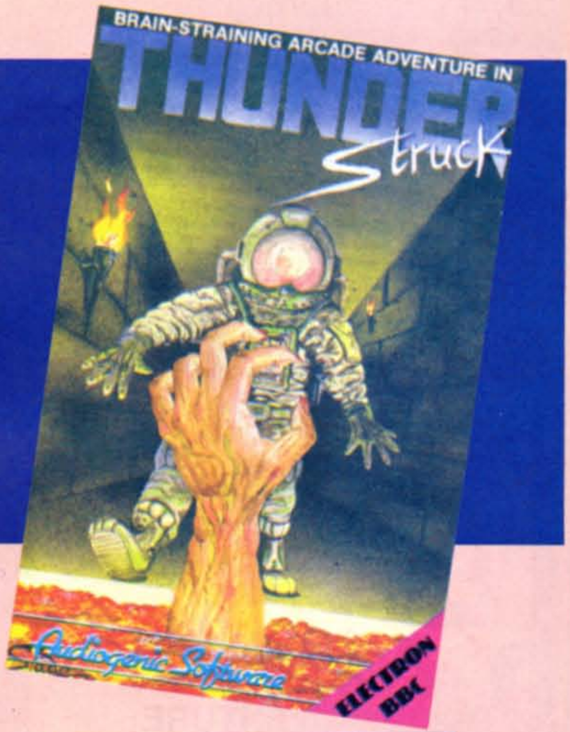

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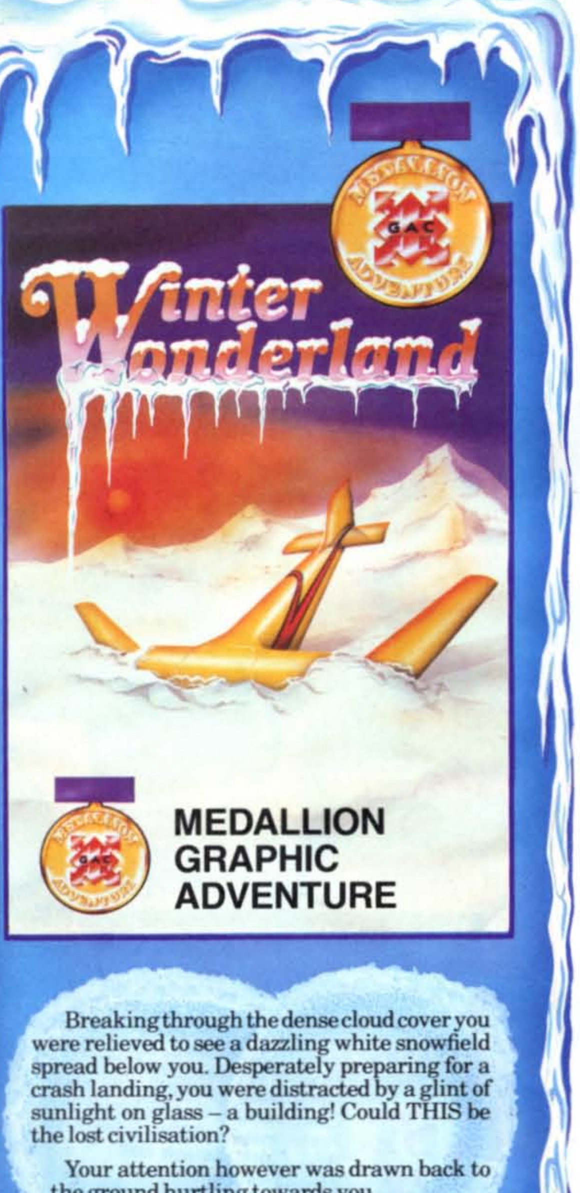

Breaking through the dense cloud cover you were relieved to see a dazzling white snowfield spread below you. Desperately preparing for a crash landing, you were distracted by a glint of sunlight on glass – a building! Could THIS be the lost civilisation?

Your attention however was drawn back to the ground hurtling towards you . . .

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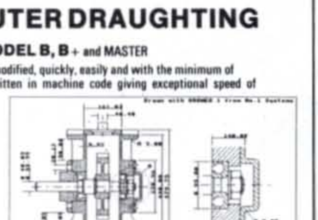

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SANTA'S SLEIGH

LOVE
RUDOLPH
X

By
ANDREW WAITE

CHRISTMAS is here once more and Santa is getting ready to deliver all his presents. The sleigh is waiting and all he needs to do is load up the goodies.

Rudolf has been put out to pasture and the sleigh is now gas powered. It's a bit of a fuel guzzler so take it easy and keep an eye on the fuel gauge.

The presents have been stolen and scattered throughout a warehouse, so you guide Santa round on his sleigh and pick them all up.

When you have collected all the presents in one room you can move on to the next through the exit at the bottom of the screen.

This is by no means an easy task since many dangers lurk deep within the warehouse.

Watch out for the large spider descending on its thread and dodge the Christmas crackers bouncing up and down. ■

Controls

Return = thrust
Z = left
X = right

VARIABLES

stage%	Screen.
live%	Number of lives left.
score%	Score.
FUEL%	Amount of fuel left.
walk%	Whether you have landed.
X%,Y%	Santa's coordinates.
HI%()	High scores.
HI$()	High score names.

Full listing starts on Page 135

Opening up the colour floodgates

STEPHEN AUSTIN outlines Flood Fill, a machine code program that offers countless new colour options

EVER felt the need to colour in an irregular shape, but found the task of using the triangle fill routines too daunting? Or have you ever felt the need for more colours?

Well here's the answer to all your prayers – a fast machine code colour flood fill routine that will fill any shape with any of the normal colours, as well as a variety of new ones.

It works with both the B and B+ in the non-shadow mode, but not on the Master – no worry to the fortunate few since the Master's MOS has its own flood fill routines.

The flood routine can be used in all of the graphics modes – that is Modes 0, 1, 2, 4 and 5. It can also be freely used in any of your Basic or machine code programs.

The new colours are obtained by mixing the normal colours in a variety of ways to create different shades and colouring effects.

The two colours to be mixed are stored in the zero page locations &8C and &8D using the indirection operators. For example, if *C1* and *C2* are the two colours to be mixed they are stored in memory as follows:

```
?&8C=C1:?&8D=C2
```

The way in which the colours are mixed is determined by a third byte stored in &8E. If this byte is *pattern*, for example, it is stored with:

```
?&8E=pattern
```

A region is filled using the statement:

```
PLOT K,X,Y
```

where *X* and *Y* are the coordinates of any point within the region to be filled. *K* is a number between 96 and 103 – &60-&67. The PLOT numbers 96 to 103 are not used by the operating system, so they are sent to the VDU extension vector at &226-&227.

The PLOT options are just the same as the other PLOT numbers for drawing lines – 0 to 7 – and for filling triangles – 80 to 87.

The fill routine intercepts this vector so that the normally unused PLOT commands can be channelled to the fill routine.

Therefore the address stored in this vector must be altered to point to the start of the fill routine – &1200. Thus before it is used the vector must be changed as follows:

```
?&226=0:?&227=&12
```

Note the vector need only be changed once – unless Break is pressed – and so for handiness this statement is best placed at the start of any program using the flood routine.

Here's a description of how the two colours are mixed to obtain new shades – the byte which refers to the way in which the colours are mixed is referred to as *pattern:*

If *pattern* = 0 the two colours are mixed by placing horizontal lines of each colour on top of each other – Figure Ia.

If *pattern* = 1 the pixels of the same colour are placed alternately next to each other dithered – Figure Ib.

If *pattern* = 2 the colours are mixed by dithering, but this time the pixels are grouped in pairs of the same colour – Figure Ic.

If *pattern* = 3 the colours are mixed by dithering, this time with groups of four identical pixels – Figure Id.

If 64 is added to *pattern* then in each of the above the first line is all one colour and the second contains the corresponding pattern giving cross-hatching – Figures IIa to IId.

If 128 is added to *pattern* vertical lines of each colour are placed next to each other – Figures IIIa to IIId.

If both 64 and 128 are added only the effect for +64 operates.

The program works on the principle that every pixel in the region to be filled has the same colour. This is the background colour. The borders of the region to be filled are pixels which have non-background colours – or the edge of the screen.

When the routine is called by the appropriate PLOT statement, before control is actually passed to the routine, the OS converts the X and Y coordinates into internal coordinates with the graphics origin and relative plots taken into account.

Internal coordinates are the coordinates that the computer itself uses for graphics. External coordinates are just the normal coordinates – that is 0=<X=<1279 and 0=<Y=<1023 – expressed in terms of pixels. See Figure IV for the internal coordinates.

The OS stores the internal coordinates of the chosen point in locations &320-&323. The fill routine retrieves these coordinates so that it can find the colour of this point using Osword 9. If

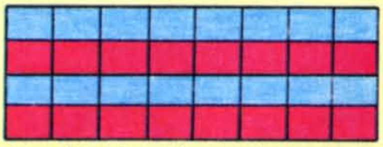


Figure Ia: Pattern = 0

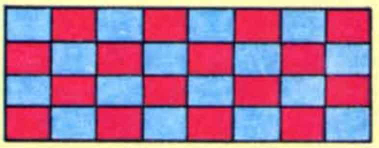


Figure Ib: Pattern = 1

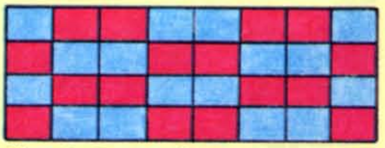


Figure Ic: Pattern = 2

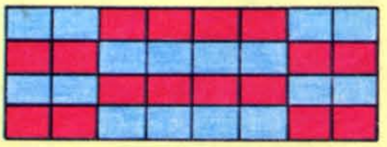


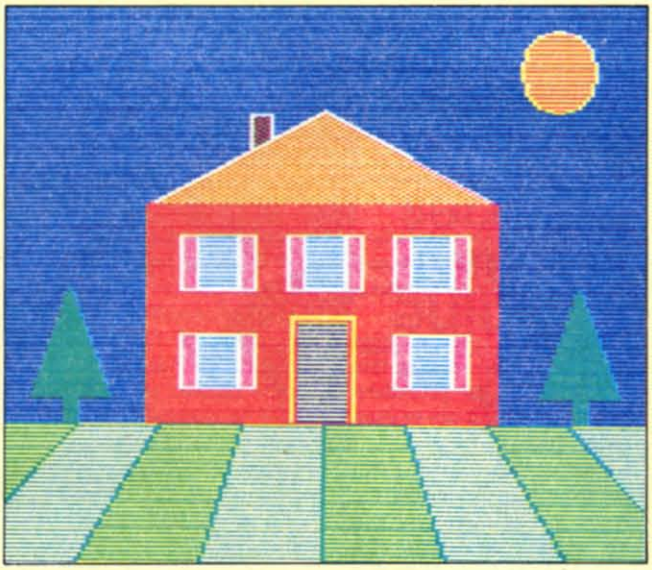
Figure Id: Pattern = 3

the colour returned is the same as the background colour these coordinates are stored in an area of workspace hereafter referred to as the coordinate stack.

The stack is of the LIFO type – Last In, First Out. This means that if two numbers were put on this stack the second number would have to be taken off the stack before the first number could be removed.

The algorithm for the fill routine is fairly simple in theory. Firstly the coordinate from the PLOT statement is stored on the coordinate stack and the colour patterns are worked out from the two colours and the pattern type.

The top coordinate is pulled off the coordinate stack. The horizontal line containing this coordinate is then filled with the colour pattern up to the first non-background coloured pixel on both the left side and the right side of this point.



The coordinates of these two points are then stored in *lx* and *rx*. Next the lines above and below the current line are scanned for groups of adjacent background coloured pixels.

The coordinate of the first pixel on the left of each of these groups is then stored on the top of the coordinate stack. Next the program loops back to take another coordinate off the coordinate stack.

This line is then filled and the lines above and below it are scanned and so on. The routine ends when there are no coordinates left on the coordinate stack. This is when the whole region has been completely filled.

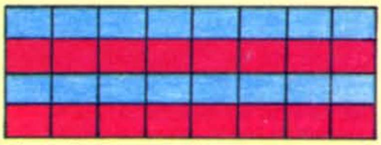


Figure IIa: Pattern = 64

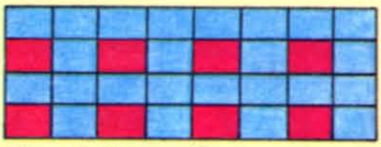


Figure IIb: Pattern = 65

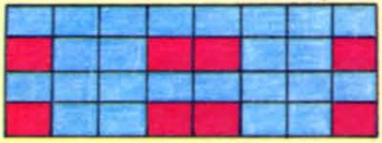


Figure IIc: Pattern = 66

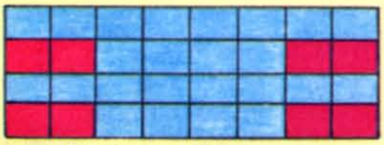


Figure IId: Pattern = 67

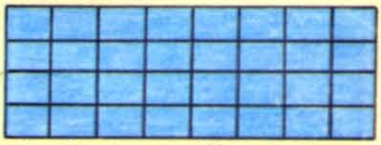


Figure IIIa: Pattern = 128

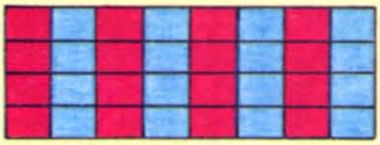


Figure IIIb: Pattern = 129

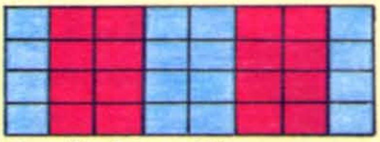


Figure IIIc: Pattern = 130

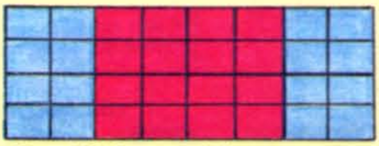


Figure IIId: Pattern = 131

Type in Program I. This is the assembly language source which generates the machine code fill routine. It is best to type this program in and then save it immediately because any mistakes could prove fatal.

It is not necessary, however, to type in all the comments at the end of each line after the / character. As the model B+ has different look-up tables line 100 sets a variable *table* to ensure the correct table is used on both B or B+.

Once the program has been saved RUN it with PAGE at &1900.

The fill routine is under 1k in length and assembles to &1200 – see below if you want to change this address. Now that the machine code has been generated it is necessary to save it. This is done with the command:

```
*SAVE "FILL" 1200 15ED
```

Whenever the fill routine is to be used the machine code program must be loaded with:

```
*LOAD "FILL"
```

Next the statement:

```
?&226=0:?&227=&12
```

must be inserted at the beginning of your program to ensure the fill routine traps all unrecognised PLOT options.

Finally the two colours and the

→

From Page 113

pattern type must be stored in memory using:

```
?&8C=col1:?&8D=col2:?&8E=pattern
```

Now the routine itself can be called with:

```
PLOT K,X,Y
```

Program II is a demonstration program that draws a picture of a house and uses the flood fill routine to colour in the picture.

It is necessary to load in the machine code routine *FILL* before running this program. PROCfill is the procedure used to fill the shapes, and it can be used in your own programs.

It has five parameters. The first two are the two colours to be mixed, the third parameter is the pattern type and the last two are the coordinates of a point in the shape to be filled. Note that the VDU vector – &226-&227 – is changed at the start of the program.

Mode	Internal coordinates	
	x	y
0	0-639	0-255
1	0-319	0-255
2	0-159	0-255
4	0-319	0-255
5	0-159	0-255

Figure IV: Internal coordinates

The machine code routine is assembled at location &1200 because this is handy for disc users. However this address can be easily changed to any other suitable location by changing the value of the variable *LOC* in Program I – line 90.

For cassette users the start address could be changed to &A00 only if the shapes to be filled are not very complex because otherwise the coordinate stack would overwrite the flood fill routine.

Other options are to increase the value of PAGE from &E00 on cassette machines to &1200 and then change the value of *LOC* to &E00. Alternatively the value of HIMEM could be lowered by &1000 bytes and the value of *LOC* then changed to that of the resulting value of HIMEM.

The location of the coordinate stack is &900 because this area is only used for file operations on cassette machines or for extended ENVELOPEs – 5 to 16. This address can also be moved by changing the value of the variable *STACKLOC* in line 90 of Program I.

Finally the range of patterns can be extended by adding entries to the data table at the end of Program I – lines 6430 and 6440. Each entry in this table is made up of a two byte sequence.

If another pair of numbers was added to this table the effect could be viewed by filling in a shape with *pattern* set to 4. If more entries than this are added increase the value of *pattern* accordingly.

Try experimenting by adding different numbers to this data table. Some very interesting results can be obtained. ■

Full listing starts on Page 141

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A&B Computing, Dec. '85

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MU

Opus.

Controlling the climate

MIKE COOK adds a hygrometer to the Body Build weather station. But it does have other uses . . .

OUR brand new Editor bounced across the room and said, "What's it to be this month then?" "A computerised hygrometer", I replied. He looked a little puzzled and asked why. "Because," I said, "I am a humid being." "Oh!" he said mysteriously, "so what the previous Editor told me about you is true." And he turned away wondering if he had made the right decision in accepting the job.

For those none the wiser for the anecdote, let me say that a hygrometer is used to measure humidity – the amount of water in the air. It is not very useful to measure the absolute amount of water vapour as this changes with temperature and pressure so we normally deal with relative humidity.

This is a measure of the amount of water vapour in the air relative to how much vapour it can take. As the total amount of water vapour depends on temperature, a sudden drop in temperature can force the relative humidity to 100 per cent and beyond. When this happens moisture is condensed out of the air as dew or fog.

Why should anyone want to monitor the RH? Well those of you who have an interest in weather measurements might like to add this to the Body Build anemometer pressure gauge and wind vane covered in the June 1985 and October 1986 issues of *The Micro User*.

But interest in this device is not restricted to that as it can be used to control and monitor air conditioning systems, humidifiers and greenhouse climate controllers. It can even be used to monitor tumble dryers to detect when the load is dry.

Traditionally electronic humidity sensors have been very expensive but now Mullard has come up with a sensor that is reasonably priced and designed to work over a range of RH between 10 and 90 per cent. While it is not a precision transducer it will perform to an accuracy of 5 per cent under worst case conditions and as these do not prevail most of the time it will be even more accurate.

Mullard is naturally cagey about exactly how the sensor works but basically it is a capacitive sensor. If you remember basic theory you will know that a capacitor is simply a pair of conducting plates separated by some insulating material known as a dielectric. It stores charge and the amount it can store is known as its capacitance, which depends on three things.

The first is the area of the plates – the more area the more charge. Secondly the closer the plates are together the more charge can be stored and finally the type of dielectric also affects the amount of charge. The measure of how a material effects capacitance is known as the material's dielectric constant.

What Mullard has done is to produce a membrane whose dielectric constant changes with the RH. As a warning is given in the data sheets that some solvents such as acetone will attack the membrane, it is a fair guess that it is some sort of plastic. To make the humidity transducer, both sides of the membrane are covered with gold to form a capacitor and the whole unit is mounted in a perforated plastic case. Thus the transducer is easy to handle and to build into a humidity sensor.

So basically the sensor will change capacitance as the RH changes. The capacitance and the change, however, are quite small – it has a value of 112pF with 10 per cent RH rising to 144pF at 90 per cent RH. So our problem is to convert this capacitance into something we can measure with our computer.

We will do this by incorporating the transducer into an oscillator. However, with such a small capacitance the oscillator will be running much too fast for accurate measurements and temperature changes would also affect the accuracy.

To overcome this we have two synchronised oscillators, one with the transducer and the other with variable capacitor trimmer. If we adjust the trimmer to be the same as the standing capacitance of the transducer and then compare the two output pulses, the difference in the two will be proportional to the RH. This is shown in Figure I.

We can simply convert this pulse into a measurable voltage by smoothing it with a resistor and capacitor and then measure it with the computer's analog input port, or more accurately with the Body Build digital voltmeter described in the April 1985 issue of *The Micro User*.

So we need to consider what oscillator to use. An oscillator is a circuit that strives to be in one condition but only achieves it when it reaches a state of "wanting to be in its original condition".

A perfect example of this was given to me by my youngest son, who's particularly fond of dummies. One day while sucking his blue dummy he

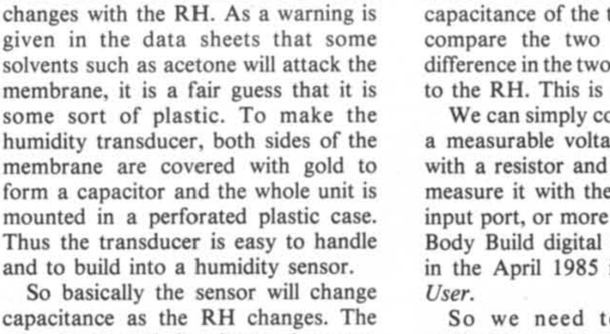

Figure I: The block diagram of the hygrometer

THE BEEB BODY BUILDING COURSE

spotted his yellow one, which proved such an attraction that he swapped it for the one he was sucking. However, now he could see his blue one and that looked nice too – so he removed the yellow one and replaced it with the blue one. This cycle continued for some time until he was distracted by my laughter.

Figure II shows the basic form of oscillator we will use. It consists of two inverter gates so called because the output is the inverse of the input. If point B is high then point C will be low and point A will also be low. But as time passes the high voltage at point B charges up the capacitor through the resistor until point A goes high.

This will cause point B to go low as they are connected through an inverter and point C will go high. As time passes the capacitor will discharge through the resistor until point A is low, driving point B high.

This cycle repeats and we have an oscillator. The time taken for the oscillator to change states is determined by the capacitor and the resistor.

Figure III shows the full circuit of the humidity monitor. You will see there are two oscillators made from gates on the same integrated circuit. This ensures that any changes in frequency due to temperature variations will occur equally to both oscillators. The oscillator with the humidity transducer is gated by the other to ensure that the two are synchronised.

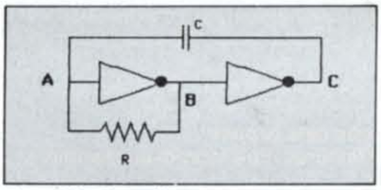

Figure II: The oscillator

The output from the two oscillators is fed into a second integrated circuit where the exclusive OR gate produces an output only when the two oscillator outputs differ. As there are four of these gates in one package we drive them all in parallel.

This uses up all the gates as CMOS should never have unconnected inputs. It also makes a nice low impedence source to drive the next stage. This is simply a smoothing circuit to average the pulse and give a steady voltage that can be measured by the computer's analog input port.

All the parts for the humidity sensor circuit are available as Body Build pack No.37. Note that the sensor alone can be purchased. You will find the order form on Page 118.

The only snag with the humidity transducer is that it has a non-linear response. This means that there is no simple relationship between relative humidity and capacitance. To compensate for this it is traditional to use a linearising circuit but these are difficult to set up and not very accurate.

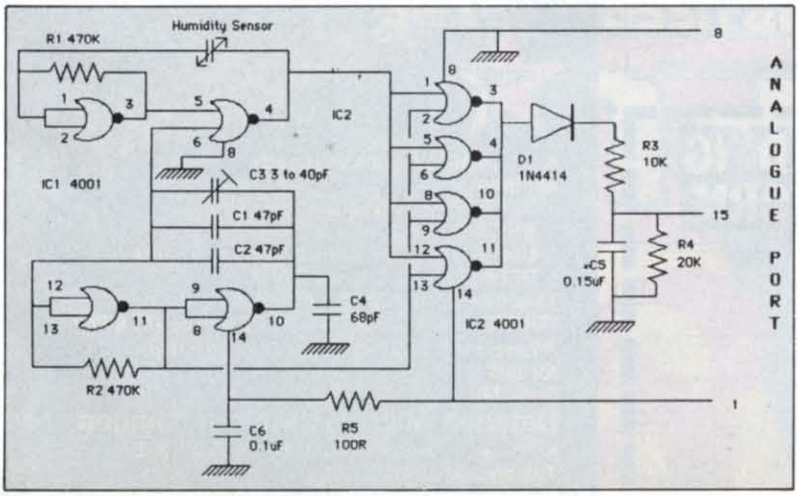

Figure III: The hygrometer

Instead the linearisation takes place in software and can be tailor-made to your sensor and so will result in quite an accurate measurement.

The data sheet for the sensor gives a curve of relative humidity against capacitance, summarised in Table I. Using this I substituted several accurately measured fixed capacitors for the humidity sensor and noted the readings from the analog input port of the computer.

I could then draw a curve of capacitance against computer reading and finally produce a list of reading and humidity to use in the linearising software.

Alternatively the list may be produced by noting the reading with the humidity sensor fitted and then measuring the humidity by some conventional means, the most common of which is a wet and dry bulb thermometer. A mixture of these two techniques may be used if you prefer.

To make it easy for you to calibrate your system, if you order the kit of parts you will get a calibrating capacitor individually measured with a note of what relative humidity it represents. Then all you have to do is substitute this capacitor for the sensor and adjust the trimmer until the correct humidity is indicated.

Program I is the routine to read the sensor and the DATA statements contain the calibration list we have just been talking about. The first number is the quantity of reading/humidity pairs we have in the other data statements. These pairs are read into two arrays then the value on the analog input port is averaged over five readings. This number is easily changed by line 150.

Having got the reading we must now see what humidity level it corresponds

→

Capacitance	Relative humidity
112pF	10%
115pF	20%
118pF	30%
121pF	40%
124pF	50%
128pF	60%
132pF	70%
137pF	80%
144pF	90%

Table I

From Page 117

to. The table of readings is then searched until we find a value in excess of our reading, so the reading we have is between the last two array entries looked at.

Line 290 works out the fractional distance our measurement is between the two table entries – for instance it may be half way. Then line 300 takes this fraction and applies it to the two corresponding humidity values.

In other words the actual humidity is half way between the two table entries. This technique is known as interpolating between table entries and gives a much more accurate reading than just relying on the table alone. The more table entries there are the more accurate this becomes.

● *In practice it takes the sensor about five minutes to respond fully to sudden changes in humidity but in most situations this is quite acceptable. So now, in the humid spirit, I can wish you a very merry Christmas.*

```
   10 MODE7
   20 PRINT TAB(0,4)"THE BEEB BODY BU
ILD COURSE"
   30 PRINT"MICRO USER DEC 1986"
   40 PRINT"By Mike Cook"
   50 PRINT"Humidity Sensor"
   60 READ N%
   70 DIM RD%(N%+1),HUM%(N%+1)
   80 FOR A%=1 TO N%
   90 READ RD%(A%),HUM%(A%)
  100 NEXT
  110 RD%(N%+1)=2000
  120 *FX16,1
  130 REPEAT
  140 ACC%=0
  150 T%=5
  160 FOR A%=1 TO T%
  170 ACC%=ACC%+(ADVAL(1) DIV 1023)
  180 TIME=0
  190 REPEAT:UNTIL TIME>10
  200 NEXT
  210 R=ACC%/T%
  220 REM Now search for value
  230 PRINT TAB(0,14);"Relative Humid
ity is ";
  240 S%=0
  250 REPEAT
  260 S%=S%+1
  270 UNTIL RD%(S%)>R
  280 IF S%=1 OR S%>N% THEN PRINT "OU
T OF RANGE":GOTO 320
  290 F=(R-RD%(S%-1))/(RD%(S%)-RD%(S%
-1))
  300 RH=HUM%(S%-1)+((HUM%(S%)-HUM%(S
%-1))*F)
  310 PRINT INT(RH+0.5);" %"
  320 UNTIL FALSE
  330 DATA 9
  340 DATA 585,10,600,20,618,30,636,4
0
  350 DATA 650,50,668,60,680,70,684,8
0
  360 DATA 700,90
```

Program I

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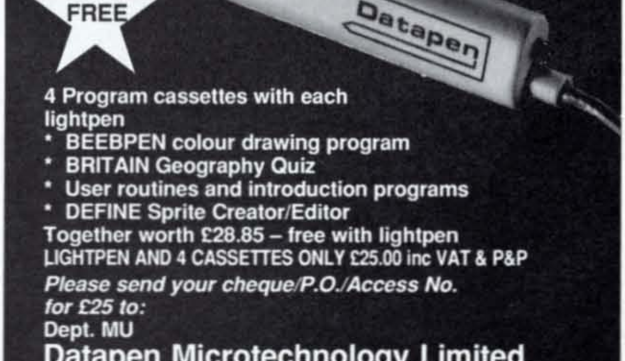

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High level constructs	Yes	Yes	No
Use any editor?	Yes	No	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C12 only	65C12 only
Switch off 65C12 opcodes	Yes	No	No
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Disassembler	Symbolic	No	Simple
Label restrictions	No	Yes	Yes

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Sounding out... and in

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THE Barry Box is a sound processor that allows you to record and play back any sound on your computer. It connects to the 1MHz bus and is driven from the auxiliary power socket. It comes complete with a microphone and operating software in rom but is not compatible with a second processor.

At this point let me declare an interest. I designed a sound sampler unit as part of the Body Building Course, published in *The Micro User* over the first three months of 1986.

Therefore I know exactly how these units behave, which is probably why I was given the Barry Box to review. Inevitably I found myself making comparisons between this unit and my own design but I hope I managed to be objective.

The construction is adequate if not terribly professional. It is housed in a small plastic box with two volume controls, for input and output level. There is one foot of ribbon cable which terminates in a connector and three miniature jack sockets on the front of the box give access to input signals (microphone and aux) and output. A fourth miniature jack socket is round the back supplying the power.

The Barry Box can be operated in two different modes, direct or program. In direct mode all commands are activated by pressing the appropriate keys.

Typing *BARRY will bring up a display of the various parameters the system is using, which include the buffer length and the sample time. These may be changed by using the cursor keys.

Other keys will directly activate an operation, for example the f1 function key will take the sample of a sound and f2 will output it.

The waveform may be displayed, saved and loaded to tape or disc as well as being transferred to sideways ram. There is also a screen dump for an Epson printer.

If you want to fill the buffer with a pure sound the tuning fork function will produce a pure sine wave. If you have a pure sound in the buffer then another function key will analyse it and report its frequency.

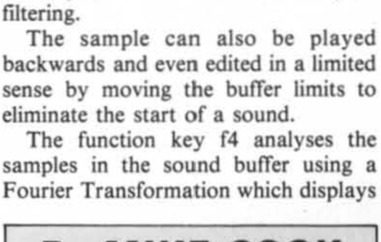
There is also some scope for sound treatment with two simple filter functions. In the manual these are referred to as "frequency smoothing" and "amplitude smoothing" but are actually different forms of low pass filtering.

The sample can also be played backwards and even edited in a limited sense by moving the buffer limits to eliminate the start of a sound.

The function key f4 analyses the samples in the sound buffer using a Fourier Transformation which displays each frequency component of the waveform. Therefore a pure sine wave should have only one component.

By MIKE COOK

In practice there is some spreading due to the nature of signal and time window used. There was not nearly enough information in the manual to determine what was being done here.



The phrase that "frequency analysis is still somewhat a matter of trial and error" is a measure of the author's confidence in his algorithms. You are encouraged to "go ahead and experiment" to get the best results. This seems a little silly as you will never know if your results are correct or merely an artifact of the sampling parameters or transformation algorithm.

In program mode the operation of the Barry Box may be controlled from within your own Basic program. By means of poking into page zero memory locations and a series of star calls to the Barry Box rom you can perform all of the functions available in direct mode.

Both the Barry Box and my sound sampler used the same basic components, namely the Ferranti 8 bit A/D and D/A converters. This produces quite good quality sound – in fact the Barry Box produces less background noise than my sound sampling unit because it does not include the switching capacitance filters. These produce some high frequency signals that beat down to produce audio whistles at certain settings.

However, the pre- and post-digitisation filters in the Barry Box are barely adequate for the job and the use of ceramic capacitors in active filters is not very good practice. Also the Barry Box is not fully address decoded which means that when it is plugged into the 1MHz bus nothing else can be connected at the same time.

The ultimate limitation of the Barry Box lies not in the hardware itself but in the manual. It simply does not tell you enough about the hardware to do anything new with it.

For example it would have been extremely helpful if the address of the A/D and D/A converters were given along with the two lines of machine code needed to access them.

This would mean that you could use the Barry Box to perform all the real time processing tricks that my sound sampler can perform including echo, multiple echo, frequency speed up and slow down as well as harmonic scale sound outputs. The hardware is capable of this but you are not given any information of how to go about it.

In short what the Barry Box does, it does well. With its software on rom it is simple to operate. It should appeal to the non-technical person who wants to have a taste of sound processing but, like so many products, its manual lets it down.

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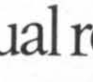

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Disc filing with a difference

Rory McCloy takes a close look at ACP's Advanced 1770 DFS – and likes what he finds

ALTHOUGH I'm an ardent admirer of the hierarchical filing system on the ADFS, I must admit that it can be confusing for newcomers, especially if they've been used to the more rudimentary Acorn versions of the DFS.

If you've been baffled by the ADFS you've almost certainly thought that it would be nice to have a DFS capable of both single and double density operation, preferably without the bother of a hierarchical directory system, which could format both sides of a double sided disc as a single drive for both single or double density filing, with the choice of a 62 file catalog.

Well ACP has produced the answer to your prayers – the Advanced 1770 DFS.

And for the Master 128, Compact and Model B+128 there's a bonus: It also includes the facility to use your 64k sideways ram as a fast ram drive.

In fact there are three separate versions of the Advanced 1770 DFS for the Electron, B+ and the Master – they are not interchangeable. The Master version was used for this article.

With this DFS ACP have expanded on the usual Acorn disc filing system and, perhaps not surprisingly, have incorporated several features familiar to users of the excellent Watford DFS. There are also some exciting new utilities (summarised in Table I) which make the upgrade well worthwhile, especially for B+ owners who haven't acquired Acorn's Advanced Disc Filing System (ADFS) yet.

Unfortunately, Model B owners with the 8271 disc controller cannot use this DFS unless they have already fitted a 1770 upgrade kit (about £42) but after reading this assessment they may well start saving up to make the change.

The Advanced 1770 DFS commands can be selected by using Z as a prefix to prevent clashes with other roms. *ZDISC will select the new DFS but, of course, Master users have the advantage of turning the Acorn 1770 DFS off by *UNPLUG. Use *INSERT to restore it.

The Acorn DFS has to be unplugged in this way since it is incorporated in the megarom, which has a higher priority than any of the user rom sockets. Master users, however, suffer the disadvantage that one rom socket is wasted by the unplugged Acorn DFS which they cannot remove.

***DISC 40 MFM 80 FM**	Enters DFS and allows all drives to be set to 40/80 track or single/double density.
***DRIVE n 40 MFM 80 FM**	Changes current drive to n (0-8) and selects 40/80 track or single/double density.
***FILES**	Display the filenames that have been opened for random access.
***FORM40 n S 80 L 160**	Formats a disc in drive n with 40/80/160 tracks and small (31 file)/large (62 file) catalog. Formatting with 160 tracks (80 on each side) a double sided disc is treated as one surface.
***MAXFILES n**	Set the maximum number of sequential files that can be open at one time to n (range 0-10). Default number and maximum with Acorn DFS is 5.
***OPT 5 n**	Allows a drive to be set up for double/single density or 40/40 track and set whether DFS automatically senses number of tracks or density of a disc. For values of n (range 0-255) see Table II.
***OPT 6 n**	Changes track sector skew to n (range 0-9) for single density discs. This can be used to minimise disc access time due to head stepping delay.
OPT 7 n	Changes track sector skew to n (range 0-15) for double density discs.
***SRDRIVE n**	Change the ram drive number to n (range 0-8). Default n=8.
***SRFORM S L**	Initialises the free sideways ram pages to be used as a ram disc with a small/large catalog.
***SRramS n**	Define which pages of sideways ram can be used as a ram drive (n=4 and/or 5 and/or 6 and/or 7). If no n defined then ram pages free for use displayed.
***WORK filename**	Sets up a default work filename to allow LOAD"" and SAVE"" without specifying a filename. *WORK alone displays current work filename.

Table I: The additional commands featured in the Advanced 1770 DFS

Unlike Acorn's and many other disc filing systems, the Advanced 1770 DFS can operate in either single density (10 sectors per track of disc) or double density modes (16 sectors per track). Double density disc storage increases your storage capacity by 60 per cent.

The single density operation of the Advanced 1770 DFS is fully compatible with the Acorn 1770 DFS provided you choose the small 31 file catalog when you format the disc. Furthermore, Watford DFS users will be delighted to find that the large 62 file catalog system of the ACP DFS is compatible with Watford's.

The double density operation is not compatible with the Acorn ADFS since the latter uses the hierarchical catalog (see *The Micro User*, July 1986) whereas the Advanced 1770 DFS uses the standard catalog, with a choice of 31 or 62 files.

For the technically inclined, the ACP DFS uses 20 bit addressing compared with Acorn's 18 bit. In both densities the filenames are limited to the usual seven character length.

Two commands, *DISC and *DRIVE, can select either the single or double density modes by postfixing the command with FM or MFM respectively. *DISC sets all drives to the same density while *DRIVE can set different drive numbers to different densities.

If you set drives 0 and 1 to different densities you can simply use *COPY to transfer files from your existing single density discs to double density discs without resort to the type of utility program required by ADFS users.

*OPT 5 *n* is another command which like *DRIVE allows you to selectively set the drives to single/double density or 40/80 track (double/single stepping), but can also determine whether the DFS will automatically recognise the density and total track number on the disc.

Here I found the manual became rather technical, lapsing into "bit interpretation" to define *n*. I hope Table II clarifies the command.

n	Auto density selection	Auto stepping selection	Drive density	Drive stepping
&00	off	off	single	normal
&10	on	off	single	normal
&20	off	on	single	normal
&30	on	on	single	normal
&40	off	off	double	normal
&50	on	off	double	normal
&60	off	on	double	normal
&70	on	on	double	normal
&80	off	off	single	double
&90	on	off	single	double
&A0	off	on	single	double
&B0	on	on	single	double
&C0	off	off	double	double
&D0	on	off	double	double
&E0	off	on	double	double
&F0	on	on	double	double

*Table II: Selections possible with the *OPT 5 n command. The hexadecimal values for n are shown for drive 0. To set up other drives (0-3) alter the first byte of the hexadecimal number (see text)*

Although I have only listed the values of *n* for drive 0, you should be able to extend this to other drives if I tell you that *OPT 5 2 would switch all the features off for drive 2 and *OPT 5 243 (&F3) would switch all this option's features on for drive 3.

One of the features of Acorn's ADFS I appreciated was the ability to format both sides of a disc into a single continuous surface so that surfaces on drives 0 and 2 become drive 0 and surfaces 1 and 3 become drive 1.

This is now possible with the Advanced 1770 DFS for both single and double density use – giving 400k and 640k of disc storage respectively – provided you have 80 track drives, by using *FORM160.

Now for the icing on the cake. A series of SR commands (Table I) allows users with an extra 64k ram (integral on the B+ 128 and Master) to format – within seconds – the sideways ram as a silicon disc. This then becomes drive 8, by default, and can be used with all the usual DFS commands.

In order to get some of the DFS commands such as *FREE, *MAP and *COMPACT to work for the ram disc you must first redefine the default drive value of 8 into the range 0-3 using *SRDRIVE. This has the drawback of your not being able to use that particular floppy disc drive number until the ram disc number is redefined.

The Advanced 1770 DFS is intelligent enough to work out which of the 16 ram pages are occupied with rom-image software and so only format the remaining space, which doesn't have to be continuous. Similarly, space in ram can be saved from formatting in case you need it for ram software later.

Thus *SRFORM could format the ram pages which correspond to rom sockets 4 and 7, in this case the ram disc would only be 32k in size.

The ram disc is ideal for use during a computing session without the delays, whirring and clicking of a disc drive, but don't forget to copy any files you want to keep on to disc before you switch off, since all the information will be lost from the ram on power down. This may sound obvious but it is easily done.

The ram disc facility should make B+ owners think about the 64k upgrade to 128k (good value at £32).

Two serious omissions from the ACP DFS are the commands to load and save to ram (*SRLOAD, *SRSAVE) which is surprising since ACP has obviously tailored this DFS to make the most of user ram. I have to insert my Acorn 1770 DFS to load ram software before switching to the Advanced 1770 DFS.

If you have a disc with a suite of programs (less than 64k in total) which is booted by Shift+Break Program I is a short text file that can be *EXECed and will demonstrate the sheer speed of the ram disc.

The listing should be entered as a text file in View without line numbers or using *BUILD and then saved on the floppy disc – but do not call it !BOOT.

It will format the ram disc with 31 file catalog, set the auto-boot option, copy all the files from floppy disc to ram disc, and set the ram disc to be drive 0 – all in a matter of moments. Finally, press Shift+Break to boot the ram disc.

```
1 *SRFORM
2 SY
3 *DRIVE 8
4 *OPT4,3
5 *COPY 0 8 *.*
6 *SRDRIVE 0
```

Program I

Even when I am loading and saving very long text files from View the response of the ram disc appears almost instantaneous, but how fast is it?

To answer this question and find out how the speed of the Advanced 1770

→

From Page 125

DFS compares with the Acorn ADFS I enlisted Jim Notman's help. Jim came round for the afternoon, drank all my coffee, and ran his now famous benchmark programs.

The results of our efforts are listed in Table III. Jim previously published the benchmarks comparing Acorn's 0.90 and 1.2 DFS, 2.20 1770 DFS and 1.30 ADFS in the December 1985 issue of *The Micro User*.

The overall timings show that the Advanced 1770 DFS (version 1.00) in double density (MFM) mode is 13 per cent faster than the Acorn ADFS (version 1.50) and the ACP ram disc filing system is 55 per cent faster than the Acorn 1770 DFS (version 2.20).

Documentation is in the form of an 80 page user guide. Throughout there are clear statements about the compatibilities and incompatibilities with the Acorn filing systems, particularly when exchanging information between large and small format discs, and discs with large and small catalogs.

However newcomers to disc filing systems would find the introductory section on disc files too brief. For the experts there is a technical section describing the OS calls for using the filing system in assembler.

Conclusion: An excellent buy for users with a 1770 disc controller which maintains full compatibility with your old single density discs and yet allows you both double density and the possibility of a very fast ram disc.

		Acorn DFS 2.2	Acorn ADFS 1.5	ACP 1.00 MFM	ACP 1.00 RAM DFS
1	OPEN + CLOSE files*1000	8.6	21.5	9.7	21.3
2a	PRINT 1000 numbers	9.9	14.4	6.3	3.6
2b	PRINT 100 strings	42.5	45.9	24.3	13.5
3a	INPUT 1000 numbers	9.5	8.8	6.1	3.2
3b	INPUT 100 strings	24.1	23.5	23.5	11.8
4	BPUT 1000 bytes	4.2	7.1	3.7	1.5
5	BGET 1000 bytes	3.3	3.1	3.5	1.3
6	Move PTR 1000 places	3.1	6.8	3.7	2.0
7a	Write relative file	44.0	47.6	45.1	14.5
7b	Read relative file	24.8	24.2	24.1	12.1
8a	Write relative file backwards	102.8	71.8	79.9	15.3
8b	Read relative file backwards	44.4	28.4	39.8	12.7

Table III: Jim Notman's DFS benchmark times in seconds using a Master

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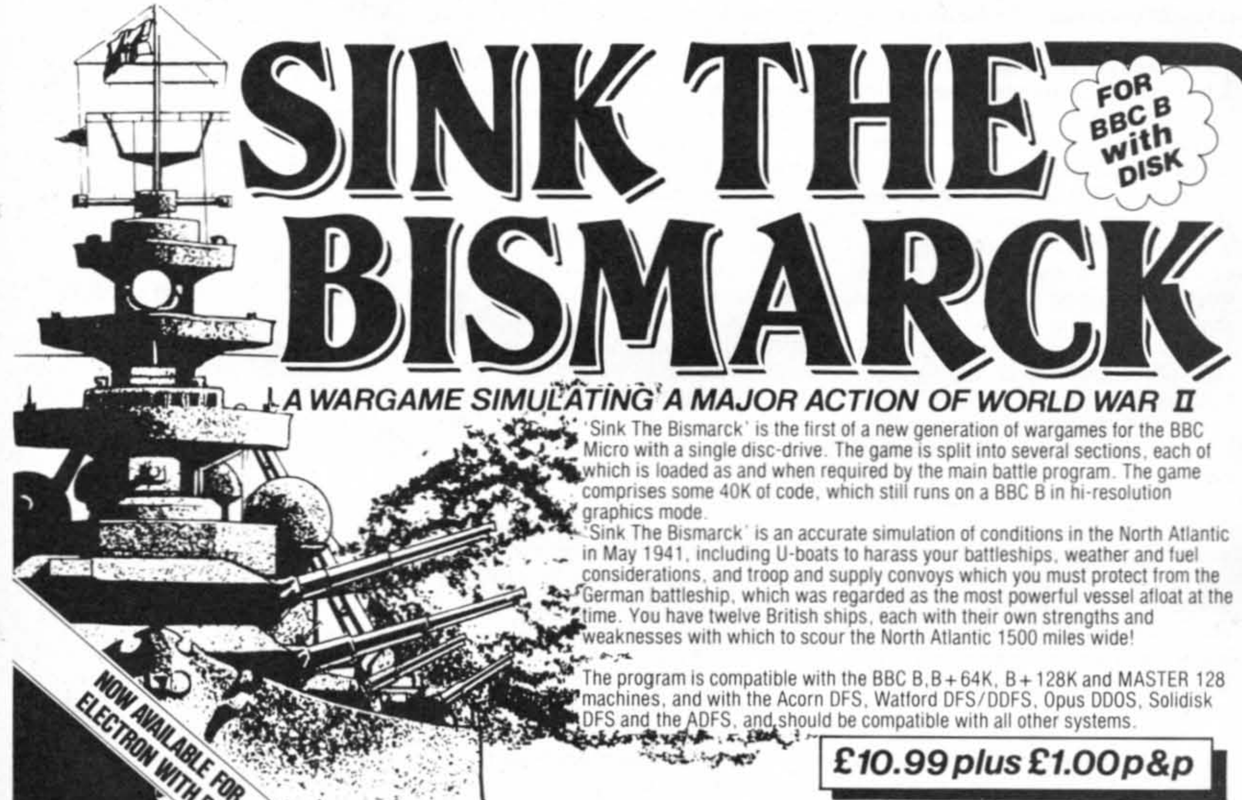

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'Sink The Bismarck' is an accurate simulation of conditions in the North Atlantic in May 1941, including U-boats to harass your battleships, weather and fuel considerations, and troop and supply convoys which you must protect from the German battleship, which was regarded as the most powerful vessel afloat at the time. You have twelve British ships, each with their own strengths and weaknesses with which to scour the North Atlantic 1500 miles wide!

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Breaking out!

CHRIS BOWERMAN's utility will recover programs – and variables

IF a program we are developing isn't quite right and we want to stop it at some point and inspect it we can either press Escape or Break.

Both methods can interrupt a program – and both have completely different effects.

The Escape key will normally stop a program. However, it is often disabled or reprogrammed to provide some other function, and the only solution is to press Break.

Unfortunately the effect of doing this is rather more drastic than Escape and the BBC Micro has an annoying habit of wiping out your program and variables. It's not very useful if you're trying to debug a program.

There is a partial solution. The Break key is function key 10 and:

```
*KEY10 OLD|M
```

will recover your program when Break is pressed. However the variables will still be lost.

This is where BreakVar comes in handy. This short utility will recover both your program and variables.

Enter the listing and save it. At the start of a programming session load and run BreakVar to set up the machine code.

Now whenever the Break key is pressed both your program and variables will be restored.

There are a few points to watch out for:

- Don't run BreakVar twice without pressing Control+Break or switching off as it can become confused and crash the micro.
- PAGE will be set to its default value. If your program is located elsewhere you can get round this problem by altering line 370 to:

```
370 $S%="*KEY10 PAGE="+STR$PAGE+"|M
CA."+STR$break+"|M"
```

- Control+Break will disable BreakVar.
- Type NEW before loading any program to delete the old one.
- BreakVar is stored at &900 so avoid this area of memory or assemble the routine to a different address by altering *org* in line 40 to an unused 281 byte area of memory.

In order to appreciate how the program works you need to understand the basics of variable storage.

They are stored in memory immediately following the program. A pointer is stored with each variable pointing to the address at which the next one with the same initial letter is to be found, thus forming long chains. So all the variables starting with the letter A form a chain, followed by the Bs, the Cs and so on.

The initial pointer to the start of each variable chain is stored at a fixed place in memory. The A chain is at &482/3, B is at &484/5 and so on. The address of any variable chain is given by &400+ASC(a$)*2, where *a$* is the initial letter of a variable.

If no variables exist for a particular initial letter its pointer contains zero.

When you hit Break Basic simply sets all the pointers to zero – leaving (thankfully) all pointers within the chains intact. All we need to do after Break is restore these initial pointers to restore our variables.

The technique used is to set up an interrupt and save the pointers every now and then.

The simplest method is to use one of the BBC Micro's events – number four to be precise – which occurs at the start of frame flyback, 50 times a second.

This particular event has nothing to do with the job in hand and is used only because it conveniently stops program execution at regular intervals so that we can note the value of the variable pointers.

The values of the pointers along with the value of *vartop,* the address of the top of the variable heap stored at &2/3, are stowed away in a safe area of ram, ready to be restored should Break be pressed.

The Break key – function key 10 – is defined to call our routine to copy the saved pointers back to their original locations.

Now you can take a well earned break without losing all your valuable programming. ■

```
   10 REM BreakVar
   20 REM By C.Bowerman
   30 REM (c) The Micro User
   40 org=&900
   50 FOR Z=0 TO 1
   60 P%=org+&83
   70 [OPTZ*2
   80 .start LDA#interrupt MOD 256:ST
A&220 \set vector
   90 LDA#interrupt DIV 256:STA&221
  100 LDA#14:LDX#4:JSR&FFF4:RTS \enab
le EVENT4
  110
  120 .interrupt \routine to save var
iables
  130 CMP#4:BNEout\end if not EVENT4
  140 PHA:TXA:PHA:TYA:PHA:PHP  \save
registers
  150 LDA&12:STA&BC:LDA&13:STA&BD \pr
eserve TOP
  160 JSRpage
  170 LDA&13:CMP&BF:BCCjump1:BNEcont
\end if memory is NEWed
  180 .jump1 LDA&12:CMP#2:BEQend
  190 .cont \....otherwise contine
  200 LDA&2:STAorg:LDA&3:STAorg+1  \s
ave VARTOP
  210 LDY#0
  220 .loop1
  230 LDA&482,Y:STAorg+2,Y  \save var
iable pointers
  240 INY:CPY#127:BNEloop1
  250 .end PLP:PLA:TAY:PLA:TAX:PLA  \
restore registers
  260 .out RTS  \finished
  270
  280 .break  \CALLed when BREAK is h
it
  290 LDAorg:STA&2:LDAorg+1:STA&3 \re
store VARTOP
  300 LDY#0:.loop2 LDAorg+2,Y:STA&482
,Y:INY:CPY#127:BNEloop2\ restore vari
able pointers
  310 LDY#1:LDA#0:STA(&8E),Y:LDA&8C:S
TA&12:LDA&8D:STA&13 \OLD
  320 JMP start \reset
  330 .page LDA#131:JSR&FFF4:STX&8E:S
TY&8F:RTS
  340 ]:NEXT
  350 CALLstart
  360 DIM S%-1
  370 $S%="*KEY10 CA."+STR$break+"|M"
  380 X%=S%:Y%=S% DIV 256:CALL&FFF7
```

by
The Mad Hatter
10/6

Underneath the spreading chestnut tree...

VILLAGE of Lost Souls by Magus is sure to become a classic. A feature well worth a closer look is the way it compiles superb chaining puzzles.

There are several of these, ranging from a simple need to find a pair of pliers for cutting a chain in church, to a very long and involved puzzle indeed.

Here is just one puzzle to give you the flavour of the scenarios Magus dreams up. It contains everything I look for in an adventure game.

Beneath the spreading chestnut tree the village smithy stands. It is a key location in the game, and I made a point of storing quite a lot of things there.

If you climb the tree on one of the branches you will find a locked chest – nut-shaped, of course!

Searching beneath the benches in the church porch showed me that there was a key down in a crack – just out of reach, naturally.

At first I went off on a wild-goose chase. I thought a stone I had seen with the description "attractive" would provide the answer. I felt it had to be a magnet!

I spent a lot of time barking up that wrong tree.

Eventually I realised that the thread attached to the key was the important factor because the key only looked like iron and so was not susceptible to a magnet after all.

It then became a matter of figuring out how to get the thread, rather than the key itself.

I found a glass rod and, later, a wisp of fleece. I took them both to the church porch, rubbed away and hey presto, the key was then mine!

Please don't think that possession of the key is the end of the chain though – it isn't.

Opening the chest(nut) revealed some herb tobacco and it was then that I realised the value of the churchwarden in the rectory.

So the pipe is filled with 'baccy and the chain still has a way to run. But I don't want to spoil things for those of you who have the game – it really is a honey of a problem.

That is what I call a satisfying puzzle. The superbly consistent and thoughtful descriptions are a model for any would-be adventure game writer.

I think Peter Austin would appreciate the following features of Village of Lost Souls – it's up to his awfully high standard of humour, as demonstrated in Dungeon Adventure.

Find a bow, examine bow, answer: It's yew. Find a looking-glass, examine looking-glass, answer: It's you. Find a fleece, examine fleece, answer: It's ewe.

All I can say is that I want three volunteers – yew, you, and ewe. Your job is to locate even worse puns.

To return to serious comment. This sort of chaining puzzle shows what the

PROBLEM CORNER

Adrian Emery is stuck in **Lord of the Rings** – how can he deal with the Green Knight? Readers' help needed here please.

He wants to know how to get out of the willow tree in **Bored of the Rings** – CRY HELP should do it.

Martin Farrington has trouble in **Jet Set Willy** – he reaches the watch tower and the game crashes, and not just on his own BBC Micro. Does anyone know why?

Nick Southgate, 34 Trent Avenue, Upminster RM14 1QZ would be glad to hear from adventure fans, particularly those who have solved **Worm in Paradise** by Level 9.

How does he get the Visor, beat the colour banding machine, take back the scale from the monster and get best use out of the furniture, dog and pizza?

Knowing Pete Austin, I'll bet the pizza just gives heartburn.

Miss T. Mell has problems in **Circus** by Adventure Soft. Where can she get a lamp? Is the clown in the tent of any significance and how does she get into the maintenance wagon?

Jonathan Morris – 860/800 in **Sphinx!** – is stuck in Melbourne House's **Classic Adventure.** How does he cross the pit where the man is waving, how can he cross the reservoir and how can he get out of the game store?

He also has a problem in Superior's **Gideons Gamble.** How can he splice the mainbrace and cool down from the hot sun when he is in the ocean?

HALL OF FAME

Stuart Booth of Aberdeen has sent me a superbly detailed solution to, and map of Level 9's Snowball. You'll see it in due course.

scope of a good adventure should be. There is time to think and lots to consider by way of possible combinations of objects and solutions.

Apart from the useful items that you will find along the way, the village is littered with things that would be there if the situation were a real one.

This cleverly adds to the difficulty of the problems to be solved without resorting to irritating features like mazes.

I'm getting near the end of Village of Lost Souls now, with a score of 800/1200 and the going is beginning to get really tough.

I spend as much time with paper and pencil on an adventure like this as I do on typing instructions.

In fact I seem to spend quite a lot of time just gazing happily at the screen, working out the possible permutations of objects that will allow me to accomplish something safely or successfully.

For me, that is the sign of a top-flight adventure.

I still try to do what many other reviewers don't seem to have time for. I play the game honestly, without a crib-sheet always by my side.

It's true that I do ask for extra help so the editor doesn't have a stroke due to late arrival of copy. But I try to play a game as legitimately as possible because then I can pass on the kind of information that people who might buy the adventure will appreciate.

Very often I am still stuck in there with you!

I'm not a know-it-all whizz kid, just a fan of adventure games. And I won't recommend something I have not tested and played properly.

I'm telling you this for two reasons. First I have seen some reviews that are no more than rehashes of advertisers' blurb.

This is painfully obvious to anyone who has actually played the game supposedly reviewed, as my local software retailer often tells me.

Secondly, I am afraid that some of you will go out and buy inferior games before I have had time to pass judgement – and then be disappointed because the promise and reality don't match.

OK, I'm not Solomon, and I did write at the beginning of my stint on this column that reviews are necessarily a personal judgement.

However, I am appalled at the idea of nice people rushing out to buy a game just because of advertisers' hype combined with ignorant reviewers' recommendations. If you are patient you might save a few pounds and a good deal of heartache as well.

● *See you next month. Until then happy adventuring.*

HELPLINE

*Simon Edwards is nearly at the end of **Sphinx Adventure,** but can't find the boat and wonders if there are permanent ways of getting rid of pirates, dwarves and rabbits.*

Rabbits eat carrots, but the other two are incorrigible. So long as the pirate puts his ill-gotten gains in his chest – and you have the keys – you can retrieve them.

Dwarves have to be endured I'm afraid Simon. The boat can be found at the foot of Castle Hill (Vampire's Castle). Simply follow the directions from the Bear's Cave to get there, Nic Outterside tells me.

Nic also furnished the solution to Chris Jones' problem in Sphinx Adventure.

Chris needs a mouse to frighten an elephant. The mouse will be discovered scurrying around the dungeon of the Vampire's Castle (Down from the Ballroom).

*Andrew Armstrong has had trouble in **Acheton** – one of the very best games for disc drive owners. How can he find the Gin, and what about the third exit in the Ningy Room?*

Answers are from the masters themselves – David Seal and Jon Thackray, joint authors of Acheton, tell me there's an earthenware pot inscribed London Dry. Guess what's inside?

There are three holes, but one of them is a one-way entrance to the Ningy Room from somewhere else.

*Gavin Shek has sent me some tips for Epic's **Wheel of Fortune.** Remember to switch the lamp off whenever coming out of the caves. And if you are jailed, quit.*

The Trolls' Cave is the place to dump treasures – so get the pipe from the vending machine, the basket from the canal south bank, DROP the basket, PLAY pipe and then you have a Troll Scarer!

The music box is a bird scarer, and to get the bucket off the obelisk use the brass key to unlock the hut, take the ladder and up you go.

Attention C. Briancourt, who is stuck in Wheel of Fortune. If Gavin's hints don't help, Epic supplies superb clue sheets.

Write to them c/o 10 Gladstone Street, Kibworth, Beauchamp, Leicester LE8 0HL but be sure to enclose an sae.

*An answer for Peter Aumayr stuck in **Voodoo Castle.** Take the sapphire ring from the coffin and wave it to open the stone door. As for the window, I'm pretty sure it's just scenery.*

*Adrian Emery has some **Return to Eden** tips. To get across the river you need to give the bird the sweet pea. The bird should lay an egg which, planted in the green sward, grows into a house.*

In the house is a fungus to give to the leviathan. Getting into the parrot's nest means you have to go N, E, W, S from the river bank.

To get down from the island you need to water the bulb from the log on the river – it should turn into a parachute which you can use to jump down safely.

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FUN ACADEMY £14.95 (disk) £12.95 (tape)

This educational compendium is suitable for children between the ages of 6-16. The content of these games has been endorsed by schools, parents and reviewers alike, offering the child the best that the computer can offer in playability, colour, sound and graphics, with solid educational content in the best traditions. The 22 routines cover area estimation, times tables, arithmetic, logical thinking, mental arithmetic, proportions, estimations, fractions, alphabet, spelling, letter grouping, word puzzles, code breakers and anagrams. It includes a massive vocabulary of 1500 words.

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From Page 103

```
10 REM 4 Direction Scrolling
20 REM By Tim M Brown
30 REM (c) The Micro User
40 MODE2:VDU23;8202;0;0;0;
50 PROCassemble
60 PROCpicture
70 VDU7
80 CALL setup
90 CALL keys
100 *FX15
110 MODE7
120 END
130 DEFPROCassemble
140 lalo=&70:lahi=&71
150 ralo=&72:rahi=&73
160 blo=&74:bhi=&75
170 tlo=&76:thi=&77
180 block=&80
190 :
200 DIM Z%600
210 FOR I%=0 TO 2 STEP2
220 P%=Z%
230 [OPT I%
240 .Right
250 LDA#13:STA &FE00
260 CLC
270 LDA &FE01:ADC#1:STA &FE01
280 LDA#12:STA &FE00
290 LDA &FE01:ADC#0:STA &FE01
300 CMP#16
310 BNE nothigh
320 LDA#6:STA &FE01
330 .nothigh
340 LDA ralo:STA blo
350 LDA rahi:STA bhi
360 SEC
370 LDA ralo:SBC#&80:STA tlo
380 LDA rahi:SBC#2:STA thi
390 LDY#7
400 .Rstore
410 LDA (blo),Y
420 STA block,Y
430 DEY
440 BPL Rstore
450 LDX#31
460 .Rmove1
470 LDY#7
480 .Rmove2
490 LDA (tlo),Y
500 STA (blo),Y
510 DEY
520 BPL Rmove2
530 LDA tlo:STA blo
540 LDA thi:STA bhi
550 SEC
560 LDA tlo:SBC#&80:STA tlo
570 LDA thi:SBC#2:STA thi
580 DEX
590 BNE Rmove1
600 LDY#7
610 .Rrestore
620 LDA block,Y
630 STA (blo),Y
640 DEY
650 BPL Rrestore
660 CLC
670 LDA ralo:ADC#8:STA ralo
680 LDA rahi:ADC#0:STA rahi
690 CMP#&80
700 BNE Rnonewline
710 LDA#&80:STA ralo
720 LDA#&7D:STA rahi
730 .Rnonewline
740 CLC
750 LDA lalo:ADC#8:STA lalo
760 LDA lahi:ADC#0:STA lahi
770 CMP#&32
780 BNE Rexit
790 LDA lalo
800 CMP#&80
810 BNE Rexit
820 LDA#0:STA lalo:LDA#&30:STA lahi
830 .Rexit
840 RTS
850 :
860 .Left
870 LDA#13:STA &FE00
880 SEC
890 LDA &FE01:SBC#1:STA &FE01
900 LDA#12:STA &FE00
910 LDA &FE01:SBC#0:STA &FE01
920 CMP#5
930 BNE notlow
940 LDA#15:STA &FE01
950 .notlow
960 LDA lalo:STA blo
970 LDA lahi:STA bhi
980 CLC
990 LDA lalo:ADC#&80:STA tlo
1000 LDA lahi:ADC#2:STA thi
1010 LDY#7
1020 .Lstore
1030 LDA (blo),Y
1040 STA block,Y
1050 DEY
1060 BPL Lstore
1070 LDX#31
1080 .Lmove1
1090 LDY#7
1100 .Lmove2
1110 LDA (tlo),Y
1120 STA (blo),Y
1130 DEY
1140 BPL Lmove2
1150 LDA tlo:STA blo
1160 LDA thi:STA bhi
1170 CLC
1180 LDA tlo:ADC#&80:STA tlo
1190 LDA thi:ADC#2:STA thi
1200 DEX
1210 BNE Lmove1
1220 LDY#7
1230 .Lrestore
1240 LDA block,Y
1250 STA (blo),Y
1260 DEY
1270 BPL Lrestore
1280 SEC
1290 LDA lalo:SBC#8:STA lalo
1300 LDA lahi:SBC#0:STA lahi
1310 CMP#&2F
1320 BNE Lnonewline
1330 LDA#&78:STA lalo
1340 LDA#&32:STA lahi
1350 .Lnonewline
1360 SEC
1370 LDA ralo:SBC#8:STA ralo
1380 LDA rahi:SBC#0:STA rahi
1390 CMP#&7D
1400 BNE Lexit
1410 LDA ralo
1420 CMP#&78
1430 BNE Lexit
1440 LDA#&F8:STA ralo:LDA#&7F:STA ra
hi
1450 .Lexit
1460 RTS
1470 :
1480 .Up
1490 LDA#13:STA &FE00
1500 CLC
1510 LDA &FE01:ADC#80:STA &FE01
1520 LDA#12:STA &FE00
1530 LDA &FE01:ADC#0:STA &FE01
```

This is one of hundreds of programs now available FREE for downloading on

MicroLink

From Page 131

```
1540 CMP#16
1550 BCC Uexit
1560 LDA#13:STA &FE00
1570 SEC
1580 LDA &FE01:SBC#0:STA &FE01
1590 LDA#12:STA &FE00
1600 LDA &FE01:SBC#&A:STA &FE01
1610 .Uexit
1620 RTS
1630 :
1640 .Down
1650 LDA#13:STA &FE00
1660 SEC
1670 LDA &FE01:SBC#80:STA &FE01
1680 LDA#12:STA &FE00
1690 LDA &FE01:SBC#0:STA &FE01
1700 CMP#6
1710 BCS Dexit
1720 LDA#13:STA &FE00
1730 CLC
1740 LDA &FE01:ADC#0:STA &FE01
1750 LDA#12:STA &FE00
1760 LDA &FE01:ADC#&A:STA &FE01
1770 .Dexit
1780 RTS
1790 :
1800 .keys
1810 LDA#19:JSR&FFF4
1820 :
1830 LDX#&BD
1840 JSR keytest
1850 CPY#&FF
1860 BNE ntest
1870 JSR Left
1880 :
1890 .ntest
1900 LDX#&9E
1910 JSR keytest
1920 CPY#&FF
1930 BNE ntest2
1940 JSR Right
1950 :
1960 .ntest2
1970 LDX#&B7
1980 JSR keytest
1990 CPY#&FF
2000 BNE ntest3
2010 JSR Up
2020 :
2030 .ntest3
2040 LDX#&97
2050 JSR keytest
2060 CPY#&FF
2070 BNE ntest4
2080 JSR Down
2090 :
2100 .ntest4
2110 LDX#&9D
2120 JSR keytest
2130 CPY#&FF
2140 BNE ntest5
2150 RTS
2160 :
2170 .ntest5
2180 JMP keys
2190 :
2200 .keytest
2210 LDA#&81:LDY#&FF:JMP &FFF4
2220 :
2230 .setup
2240 LDA#&32:STA lahi
2250 LDA#&78:STA lalo
2260 LDA#&7D:STA rahi
2270 LDA#&80:STA ralo
2280 RTS
2290 ]
2300 NEXT
2310 ENDPROC
2320 DEFPROCpicture
2330 X%=640:XD=-8
2340 VDU29,640;512;
2350 GCOL0,6
2360 REPEAT
2370 MOVEX%,X%:DRAW-X%,X%:DRAW-X%,-X
%:DRAWX%,-X%:DRAWX%,X%
2380 X%=X%+XD:XD=XD*1.1
2390 UNTIL X%<=0
2400 VDU29,0;0;
2410 FORK=0 TO 1
2420 GCOLK,1
2430 PROCcircle(540,512,200)
2440 GCOLK,2
2450 PROCcircle(740,512,200)
2460 GCOLK,4
2470 PROCcircle(640,685,200)
2480 NEXT
2490 ENDPROC
2500 DEFPROCcircle(X%,Y%,R%)
2510 VDU29,X%;Y%;
2520 FORX%=-R% TO 0STEP8
2530 Y%=SQR(R%^2-X%^2)
2540 MOVEX%,Y%:DRAWX%,-Y%
2550 MOVE-X%,Y%:DRAW-X%,-Y%
2560 NEXT
2570 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 167.

PROBLEM

I ORDERED Monopoly on disc from Leisure Genius through *The Micro User*. When I went to use it all that happened was a lot of very fast head movement and then Disc fault on the screen. I have got a Cumana twin disc drive 400k and an Acorn DFS.

When I rang Leisure Genius they said there is an *FX command that changes the drive from 80 to 40 track as my drive does not have a switch to do this. Will this *FX command work? Or is the disc incompatible with my drive. If there is such a call can you please tell me what it is as I can find no other solution to my problem – apart from sending the disc back. – M.D. Cooper, Sevenoaks.

SOLVED

*There is no *FX command in the Acorn system for changing an 80 track drive to a 40 track. With the Watford system *FX110,0,255 will perform this feat but some software will not play along with it. The only sure fire solution is to use my 40/80 drive switch converter board in the October '85 issue of* The Micro User.

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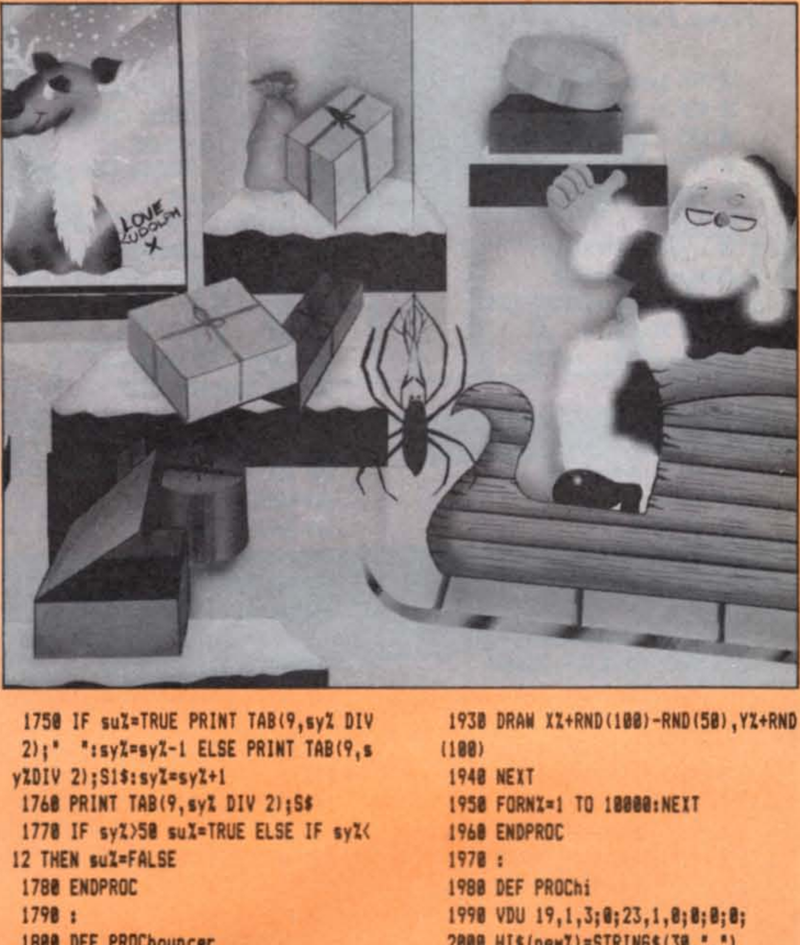
From Page 111

```
  10 REM Santa's Sleigh
  20 REM By Andrew Waite
  30 REM (c) The Micro User
  40 MODE7:VDU23,1,0;0;0;0;19,1,2;0;
  50 PROCinst:PROCinit
  60 REPEAT
  70 live%=4:score%=0
  80 stage%=1:tres%=0
  90 ex1%=FALSE:RESTORE 2390
 100 FOR N%=1 TO 8
 110 READ tx%(N%),ty%(N%)
 120 NEXT
 130 REPEAT
 140 MODE 5
 150 VDU 23;8202;0;0;0;
 160 COLOUR 129
 170 FOR N%=0 TO 29
 180 PRINT TAB(0,N%);CHR$224;TAB(19,
N%);CHR$224
 190 NEXT
 200 COLOUR 128:COLOUR 1
 210 PRINT TAB(2,27);"00000"
 220 PRINT TAB(7-LEN STR$(score%),27
);score%
 230 PRINT TAB(15,29);stage%
 240 PRINT TAB(4,29);live%
 250 COLOUR 3
 260 PRINT TAB(2,26);"SCORE"
 270 PRINT TAB(14,26);"FUEL"
 280 PRINT TAB(13,28);"SCREEN"
 290 PRINT TAB(2,28);"LIVES"
 300 RESTORE 2350
 310 FOR N%=1 TO 56
 320 READ X%,Y%,W%,V%
 330 IF V%=224 COLOUR 129:COLOUR 3
 340 IF V%=225 COLOUR 128:COLOUR 3
 350 IF V%=234 COLOUR 128:COLOUR 2
 360 IF V%=235 COLOUR 128:COLOUR 1
 370 PRINT TAB(X%,Y%);STRING$(W%,CHR
$V%);
 380 NEXT
 390 VDU 5
 400 RESTORE 2400
 410 FOR N%=1 TO 8
 420 READ X%,Y%
 430 IF tx%(N%)=0 THEN 460
 440 GCOL 0,1:MOVE X%*64,(32-Y%)*32:
VDU250
 450 GCOL 0,2:MOVE X%*64,(32-Y%)*32:
VDU251
 460 NEXT
 470 B$=CHR$240+CHR$241
 480 S$=CHR$228+CHR$229
 490 S1$=CHR$230+CHR$231
 500 sy%=10:su%=FALSE:by%=3:up%=TRUE
 510 X%=628:Y%=200:FUEL%=400:SPEED%=
0
 520 char%=226:char2%=227:new%=0
 530 out%=TRUE:walk%=FALSE:GCOL 3,1
 540 MOVE X%,Y%:PRINT CHR$226
 550 COLOUR 128:COLOUR 1
 560 IF G$="K" PROCkey ELSE PROCjoy
 570 UNTIL live%=0
 580 FORN%=1 TO 10
 590 FORM%=1 TO 2000:NEXT
 600 PRINT TAB(4+N%,15);MID$("GAME
OVER",N%,1)
 610 NEXT
 620 FORN%=1 TO 10000:NEXT
 630 FOR N%=8 TO 1 STEP -1
 640 IF score%>HI%(N%) HI%(N%)=HI%(N
%-1):HI$(N%)=HI$(N%-1):new%=N%
 650 NEXT
 660 MODE7:PROChi
 670 UNTIL FALSE
 680 :
 690 DEF PROCinit
 700 VDU 23,224,255,16,16,16,255,1,1
,1
 710 VDU 23,225,0,0,0,0,0,0,0,255
 720 VDU23,226,48,112,120,176,58,57,
127,126
 730 VDU23,227,12,14,30,13,92,156,25
4,126
 740 VDU23,228,135,127,57,123,255,52
,84,147
 750 VDU23,229,225,254,156,222,255,4
4,42,201
 760 VDU23,230,1,1,1,1,1,1,1,1
 770 VDU23,231,128,128,128,128,128,1
28,128,128
 780 VDU 23,234,129,66,36,24,24,36,6
6,129
 790 VDU 23,235,0,0,0,0,8,28,62,127
 800 VDU23,240,247,119,255,127,255,1
27,247,119
 810 VDU23,241,238,239,254,255,254,2
55,238,239
 820 VDU23,250,231,231,231,0,0,231,2
31,231
 830 VDU23,251,24,24,24,255,255,24,2
4,24
 840 DIM tx%(8),ty%(8)
 850 DIM HI$(10),HI%(10)
 860 FOR N%=1 TO 10
 870 HI$(N%)="The Micro User"
 880 HI%(N%)=1100-(100*N%)
 890 NEXT
 900 ENDPROC
 910 :
 920 DEF PROCkey
 930 REPEAT
 940 IF INKEY(-98) L%=TRUE ELSE L%=F
ALSE
 950 IF INKEY(-67) R%=TRUE ELSE R%=F
ALSE
 960 IF INKEY(-74) F%=TRUE ELSE F%=F
ALSE
 970 PROCgame
 980 UNTIL out%=FALSE
 990 ENDPROC
1000 :
1010 DEF PROCjoy
1020 REPEAT
1030 joy%=ADVAL(1)
1040 but%=ADVAL(0) AND 3
1050 IF joy%>&D000 L%=TRUE ELSE L%=F
ALSE
1060 IF joy%<&2000 R%=TRUE ELSE R%=F
ALSE
1070 IF but%=1 THEN F%=TRUE ELSE F%=
FALSE
1080 PROCgame
1090 UNTIL out%=FALSE
1100 ENDPROC
1110 :
1120 DEF PROCgame
1130 GCOL 3,1:X1%=X%:Y1%=Y%:char2%=c
har%
1140 IF L%=TRUE X%=X%-12:char%=227 E
LSE IF R%=TRUE X%=X%+12:char%=226
1150 IF F%=TRUE AND FUEL%>0 SPEED%=S
PEED%+2:FUEL%=FUEL%-1:SOUND &10,-15,5
,7
1160 Y%=Y%+SPEED%:IF walk%=FALSE SPE
ED%=SPEED%-1
1170 MOVE X%,Y%:PRINT CHR$(char%):MO
VE X1%,Y1%:PRINT CHR$(char2%)
1180 VDU 4:IF stage%>1 PROCspider:IF
 stage%>2 PROCbouncer
1190 PRINT TAB(14,27);FUEL%;" ":VDU
5
1200 A%=POINT(X%,Y%):B%=POINT(X%+56,
Y%):C%=POINT(X%,Y%-32):D%=POINT(X%+56
,Y%-32)
1210 IF (C%=3 OR D%=3) AND SPEED%>-9
 SPEED%=0:walk%=TRUE ELSE walk%=FALSE
1220 IF walk%=TRUE AND A%=0 AND B%=0
 ENDPROC
1230 IF A%=0 AND B%=0 AND C%=0 AND D
%=0 ENDPROC
1240 IF C%=-1 AND tres%=8 PROCend:ou
t%=FALSE:ENDPROC
1250 atres%=tres%:PROCtreasure:IF (a
tres%+1)=tres% ENDPROC
1260 PROCexplode:out%=FALSE:ENDPROC
1270 :
1280 DEF PROCtreasure
1290 RESTORE 2400
```

```
 1300 FOR N%=1 TO 8:READ px%,py%
 1310 IF ((N%<5 AND X%<=tx%(N%)) OR (
N%>4 AND X%+40>=tx%(N%))) AND (ty%(N%
)-8<Y% AND ty%(N%)+36>Y%) PROCscore
 1320 NEXT
 1330 ENDPROC
 1340 :
 1350 DEF PROCscore
 1360 VDU 4
 1370 COLOUR 3
 1380 PRINT TAB(px%,py%);CHR$225;TAB(
px%,py%-1);" "
 1390 COLOUR 1
 1400 score%=score%+100
 1410 tres%=tres%+1
 1420 tx%(N%)=0:ty%(N%)=0
 1430 SOUND 1,-15,100,5
 1440 PRINT TAB(7-LEN STR$(score%),27
);score%
 1450 IF score%>1999 AND ex1%=FALSE l
ive%=live%+1:FOR M%=1 TO 3:SOUND 1,-1
5,200,5:SOUND 1,0,0,5:NEXT:ex1%=TRUE:
PRINT TAB(4,29);live%
 1460 VDU 5
 1470 SPEED%=0
 1480 GCOL0,1
 1490 MOVEX%,Y%
 1500 PRINTCHR$char%
 1510 GCOL3,1
 1520 ENDPROC
 1530 :
 1540 DEF PROCend
 1550 VDU 4
 1560 REPEAT
 1570 IF FUEL%>4 score%=score%+4:FUEL
%=FUEL%-4 ELSE score%=score%+FUEL%:FU
EL%=0
 1580 PRINT TAB(7-LEN STR$(score%),27
);score%
 1590 PRINT TAB(14,27);FUEL%;" "
 1600 SOUND &11,-15,200-FUEL%,1
 1610 UNTIL FUEL%=0
 1620 *FX 15,1
 1630 RESTORE 2390
 1640 FOR N%=1 TO 8
 1650 READ tx%(N%),ty%(N%)
 1660 NEXT
 1670 tres%=0:CLS
 1680 PRINT''" YOU ESCAPE TO FIND"''"
 MORE presents..."
 1690 FOR N%=1 TO 10000:NEXT
 1700 stage%=stage%+1
 1710 VDU 5
 1720 ENDPROC
 1730 :
 1740 DEF PROCspider
```



```
 1750 IF su%=TRUE PRINT TAB(9,sy% DIV
 2);"  ":sy%=sy%-1 ELSE PRINT TAB(9,s
y%DIV 2);S1$:sy%=sy%+1
 1760 PRINT TAB(9,sy% DIV 2);S$
 1770 IF sy%>50 su%=TRUE ELSE IF sy%<
12 THEN su%=FALSE
 1780 ENDPROC
 1790 :
 1800 DEF PROCbouncer
 1810 PRINT TAB(4,by%);"  ";TAB(14,25
-by%);"  "
 1820 IF by%<3 up%=FALSE ELSE IF by%>
22 up%=TRUE
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
 1830 IF up%=TRUE by%=by%-1 ELSE by%=
by%+1
 1840 PRINT TAB(4,by%);B$;TAB(14,25-b
y%);B$
 1850 ENDPROC
 1860 :
 1870 DEF PROCexplode
 1880 live%=live%-1
 1890 VDU 4:GCOL 0,3
 1900 SOUND &10,-15,6,40
 1910 FOR N%=1 TO 20
 1920 MOVE X%+20,Y%-20
 1930 DRAW X%+RND(100)-RND(50),Y%+RND
(100)
 1940 NEXT
 1950 FORN%=1 TO 10000:NEXT
 1960 ENDPROC
 1970 :
 1980 DEF PROChi
 1990 VDU 19,1,3;0;23,1,0;0;0;0;
 2000 HI$(new%)=STRING$(30,".")
 2010 *FX 15,1
 2020 HI%(new%)=score%
 2030 IF new%<>0 PROCprinthi:PRINT TA
B(7,22);"Please enter your name":INPU
T TAB(5,2+(2*new%))HI$(new%)
 2040 PROCprinthi
 2050 PRINT TAB(3,23)CHR$131;"Hold Sp
ace or Fire for a new game"
 2060 REPEAT FORI%=4 TO 19 STEP2:PRIN
TTAB(1,I%)CHR$(RND(7)+127):FORJ%=1TO1
0:NEXT:NEXT: UNTIL INKEY(0)=32 OR (AD
VAL(0)AND3)=1
 2070 ENDPROC
 2080 :
 2090 DEF PROCprinthi
 2100 CLS:VDU23;8202;0;0;0;
 2110 FORX=1 TO 2:PRINT TAB(10,X)CHR$
141CHR$130;"TODAY'S HI SCORES":NEXT
 2120 FOR N%=1 TO 8
 2130 PRINT'CHR$(128+(N% MOD 7));" ";
N%;STRING$(3-LEN STR$(N%)," ");HI$(N%
);STRING$(30-LEN HI$(N%),".");HI%(N%)
 2140 NEXT
 2150 IF new%=0 PRINT TAB(9,20)CHR$13
0CHR$136;" Your score was ";score%
 2160 ENDPROC
 2170 :
 2180 DEFPROCinst
 2190 FOR X= 1 TO 2:PRINT TAB(1,X)CHR
$141CHR$131;"Santa's Sleigh......by A
ndrew Waite":NEXT X
 2200 PRINT'CHR$129"Someone has stole
n Santa's presents and"CHR$129"hidden
 them in an old warehouse. It is":PRI
NTCHR$129"guarded by a gruesome spide
r and two":PRINTCHR$129"grisly bounce
rs."
 2210 PRINT'CHR$134"Santa can land on
 the brick floors but":PRINTCHR$134"w
atch out for the spikes and don't":PR
INTCHR$134"crash land too quickly! Sa
nta's sleigh":PRINTCHR$134"has a limi
ted supply of fuel so you'll":
 2220 PRINTCHR$134"have to be very ca
reful."
 2230 PRINT'CHR$129"After collecting
all the presents in a":PRINTCHR$129"r
oom, move on to the next through the"
:PRINTCHR$129"tunnel at the bottom of
 the screen."
 2240 PRINT'CHR$130"   Z=LEFT   X=RIG
HT   RETURN=FIRE":PRINTCHR$130"
  or use a joystick."
 2250 PRINT'CHR$131"Do you want sound
 in the game Y/N? "
 2260 REPEAT:G$=GET$:UNTIL G$="Y" OR
G$="N"
 2270 IF G$="N" THEN *FX 210,1
 2280 IF G$="Y" THEN *FX 210,0
 2290 PRINTCHR$11;SPC(6);CHR$131;CHR$
136"Press Space or Fire"SPC(8)
 2300 REPEAT
 2310 G$=INKEY$(5):IFG$=" " G$="K"
 2320 IF (ADVAL(0)AND3)=1 G$="J"
 2330 UNTIL G$="K" OR G$="J"
 2340 ENDPROC
 2350 DATA 0,0,20,224,0,30,9,224,11,3
0,9,224,1,25,8,224,11,25,8,224,8,26,1
,224,8,27,1,224,8,28,1,224,8,29,1,224
,11,26,1,224,11,27,1,224,11,28,1,224,
11,29,1,224,6,4,8,224,7,8,2,224,7,12,
2,224,7,5,1,224,7,6,1,224,7,7,1,224,1
2,5,1,224
 2360 DATA 12,6,1,224,12,7,1,224,11,8
,2,224,1,5,3,224,1,10,3,224,1,15,3,22
4,1,20,3,224,16,5,3,224,16,10,3,224,1
6,15,3,224,16,20,3,224,6,12,3,224,6,1
8,3,224,11,12,3,224,11,18,3,224,9,1,2
,224,9,2,2,224,9,3,2,224
 2370 DATA 6,17,3,225,11,17,3,225,1,4
,3,225,1,9,3,225,1,14,3,225,1,19,3,22
5,16,4,3,225,16,9,3,225,16,14,3,225,1
6,19,3,225,6,11,3,225,11,11,3,225,1,2
4,8,235,11,24,8,235
 2380 DATA 6,3,3,235,11,3,3,235,8,7,1
,225,11,7,1,225
 2390 DATA 196,896,196,736,196,578,19
6,418,1052,896,1052,736,1052,578,1052
,418
 2400 DATA 2,4,2,9,2,14,2,19,17,4,17,
9,17,14,17,19
```

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The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

PRICE £25.00 + VAT

DIAGRAM UTILITIES

A suite of six utility programs which add additional features to the 'Diagram' drawing program. The utilities include the saving and loading of areas of diagram to and from disc. The ability to display the whole of your large diagram on the screen at one time (in either 4★4 or 8★8 screen format). The addition of borders and screen indents to diagrams, and the ability to shift a whole diagram in any direction.

PRICE £10.00 + VAT

MARCONI TRACKER BALL

This high quality device comes with it's own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

PRICE £60.00 + VAT p&p £1.75
PRICE INCLUDING 'DIAGRAM' SOFTWARE £79.00 + VAT p&p £1.75

TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

PRICE £12.50 + VAT

PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). These is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" ★ 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample prinouts.

PRICE £85.00 + VAT

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From Page 105

```
   10 REM Christmas Box
   20 REM By R.A.Waddilove
   30 REM (c) Micro User
   40 *TV255,1
   50 MODE 7
   60 PROCinitialise
   70 PROCinstructions
   80 MODE 2
   90 REPEAT
  100 PROCvariables
  110 PROCboard
  120 PROCset_code
  130 REPEAT
  140 PROCinput
  150 PROCcheck
  160 UNTIL correct OR guesses=12
  170 IF correct PROCgot_it ELSE PROC
failed
  180 PROCanother_game
  190 UNTIL INSTR("Nn",key$)
  200 MODE 7
  210 END
  220
  230 DEF PROCinstructions
  240 FOR i=1 TO 2:PRINT TAB(10)CHR$1
41"Christmas Box":NEXT
  250 PRINT''CHR$131"It's Christmas E
ve and the presents"'CHR$131"are unde
r the tree. Can you guess"'CHR$131"wh
at is in them?"
  260 PRINT'CHR$134"There are seven d
ifferent types of"'CHR$134"present nu
mbered 1 to 7 and you"'CHR$134"have t
welve guesses. Press a number"'CHR$13
4"to place a present and delete to"'C
HR$134"erase it."
  270 PRINT'CHR$131"Your guess will b
e marked: a black"'CHR$131"peg means
that one of the presents"'CHR$131"is
correct and in the right place."
  280 PRINT CHR$131"A white peg means
 that one of the"'CHR$131"presents is
 correct but in the"'CHR$131"wrong pl
ace."
  290 PRINT''CHR$129"Press the SPACE
BAR to start...";
  300 REPEAT UNTIL GET
  310 ENDPROC
  320
  330 DEF PROCinitialise
  340 VDU23,224,60,126,255,255,255,25
5,126,60
  350 VDU23,225,124,68,108,40,40,40,4
0,16
  360 VDU23,226,124,124,124,56,56,56,
56,16
  370 VDU23,230,239,239,239,239,0,239
,239,239
  380 VDU23,240,60,60,60,60,60,60,129
,255
  390 VDU23,241,136,138,141,137,138,1
40,248,112
  400 VDU23,242,16,40,16,124,186,16,4
0,108
  410 VDU23,243,56,124,254,190,190,22
2,124,56
  420 VDU23,244,189,90,153,255,195,12
6,66,195
  430 VDU23,245,255,169,217,175,221,1
75,221,255
  440 VDU23,246,248,252,250,255,255,2
55,170,68
  450 DIM code(5),guess(5)
  460 DIM marked_answer(5)
  470 DIM marked_guess(5)
  480 *FX4,1
  490 ENDPROC
  500
  510 DEF PROCvariables
  520 VDU22,1,23,1,0;0;0;0;
  530 guesses=0
  540 PRINT TAB(7,10)"How many types
of present?":COLOUR2:PRINT TAB(13,18)
"Press 4 - 7"
  550 REPEAT
  560 level=GET-48
  570 UNTIL level>3 AND level<8
  580 correct=0
  590 VDU22,2,23,1,0;0;0;0;
  600 ENDPROC
  610
  620 DEF PROCboard
  630 CLS:COLOUR 7:PRINT"   Xmas  Box
";TAB(3,27);
  640 FOR i=1 TO 5:R%=RND(7):COLOUR R
%:COLOUR 128+R%EOR7:VDU 230,9:NEXT
  650 COLOUR7:COLOUR128:PRINT TAB(0,3
0)"Keys:";:FOR i=1 TO level:COLOUR7:V
DU 48+i,8,10:COLOUR i:VDU 239+i,9,11:
NEXT
  660 FOR i=208 TO 976 STEP 64
  670 MOVE 96,i:DRAW 1160,i
  680 NEXT
  690 MOVE 96,96:DRAW 1160,96
  700 MOVE 160,96:DRAW 160,976
  710 MOVE 96,96:DRAW 96,976
  720 MOVE 800,96:DRAW 800,976
  730 MOVE 1160,96:DRAW 1160,976
  740 SOUND1,-15,50,5
  750 ENDPROC
  760
  770 DEF PROCset_code
  780 FOR i=1 TO 5
  790 code(i)=RND(level)
  800 NEXT
  810 ENDPROC
  820
  830 DEF PROCinput
  840 *FX21
  850 guesses=guesses+1
  860 PRINT TAB(3,26-2*guesses);
  870 VDU23,1,1;0;0;0;
  880 i=0
  890 REPEAT
  900 i=i+1
  910 REPEAT
  920 present=GET-48
  930 IF i>1 AND present=79 VDU 8,127
:i=i-1
  940 UNTIL present>0 AND present<=le
vel
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
  950 SOUND1,-15,100,1
  960 guess(i)=present
  970 COLOUR present:VDU 239+present,
9
  980 UNTIL i=5
  990 VDU23,1,0;0;0;0;
 1000 ENDPROC
 1010
 1020 DEF PROCcheck
 1030 COLOUR 7
 1040 FOR i=1 TO 5
 1050 IF guess(i)=code(i) PROCblack_p
eg ELSE marked_answer(i)=FALSE:marked
_guess(i)=FALSE
 1060 NEXT
 1070 IF correct=5 ENDPROC
 1080 correct=0
 1090 FOR i=1 TO 5
 1100 FOR j=1 TO 5
 1110 IF guess(j)=code(i) AND NOT mar
ked_answer(i) AND NOT marked_guess(j)
 PROCwhite_peg
 1120 NEXT
 1130 NEXT
 1140 ENDPROC
 1150
 1160 DEF PROCblack_peg
```

→

From Page 139

```
1170 VDU 225
1180 correct=correct+1
1190 marked_answer(i)=TRUE
1200 marked_guess(i)=TRUE
1210 ENDPROC
1220
1230 DEF PROCwhite_peg
1240 VDU 226
1250 marked_answer(i)=TRUE
1260 marked_guess(j)=TRUE
1270 ENDPROC
1280
1290 DEF PROCgot_it
1300 COLOUR 8
1310 PRINT TAB(3,0)"Xmas  Box"
1320 SOUND1,-15,100,20
1330 PROCpause(500)
1340 COLOUR 7
1350 PRINT TAB(3,0)"Xmas  Box"
1360 PROCdisplay_answer
1370 ENDPROC
1380
1390 DEF PROCfailed
1400 COLOUR 15
1410 PRINT TAB(3,27)" FAILED  "
1420 PRINT CHR$8;
1430 SOUND1,-15,0,20
1440 PROCpause(500)
1450 PRINT TAB(3,27)SPC9
1460 PROCdisplay_answer
1470 ENDPROC
1480
1490 DEF PROCdisplay_answer
1500 PRINT TAB(3,27);
1510 FOR i=1 TO 5
1520 SOUND1,-15,100,5
1530 COLOUR code(i)
1540 VDU 239+code(i),9
1550 PROCpause(50)
1560 NEXT
1570 COLOUR 15:PRINT CHR$30"  Press
Space    "
1580 *FX21
1590 REPEAT UNTIL GET
1600 ENDPROC
1610
1620 DEF PROCanother_game
1630 VDU22,1,23,1,0;0;0;0;
1640 COLOUR 3
1650 PRINT TAB(12,5)"Do you want to"
TAB(13,7)"play again ?"
1660 COLOUR2:PRINT TAB(12,10)"(Press
Y or N)":*FX21
1670 REPEAT
1680 key$=GET$
1690 UNTIL INSTR("YyNn",key$)
1700 VDU22,2,23,1,1;0;0;0;
1710 ENDPROC
1720
1730 DEF PROCpause(delay)
1740 TIME=0
1750 REPEAT UNTIL TIME>delay
1760 ENDPROC
```

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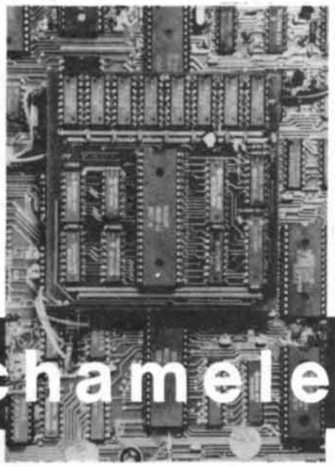

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Program I

```
   10REM
   20REM Colour Fill
   30REM By Stephen Austin
   40REM (c) The Micro User
   50REM
   60X%=&70:Y%=&72:scan_dir=&73:lx=&7
4:rx=&76:prev_lx=&78:prev_rx=&7A:prev
_y=&7C:pointer=&7D:screen=&7E
   70temp1=&80:temp2=&81:temp3=&82:te
mp4=&83:temp5=&84:tempy=&85:stack=&86
:back=&88:mask=&89:pat=&8A:pattern=&8
B:col1=&8C:col2=&8D:type=&8E:column=&
8F
   80pixels_per_byte=&A8:block_line=&
A9:temp_lx_and_rx=&AA:OSWORD=&FFF1:?&
226=0:?&227=&12
   90STACKLOC=&900:LOC=&1200:REM Cass
ette users change LOC to &A00
  100MODE135:IF HIMEM=&7C00 THEN tabl
e=&C423 ELSE MODE7:table=&C41A:REM se
t up table for model B or B+
  110FORPASS=0TO2STEP2
  120P%=LOC
  130[OPTPASS
  140BCCbegin
  150.end
  160RTS
  170.begin
  180CMP#96  \Is the PLOT number
  190BCCend  \between 96 and 104
  200CMP#104 \If not exit from
  210BCSend  \the program
  220LDX#1        \Store 1 in coordina
te
  230STXpointer  \stack pointer
  240DEX
  250STXSTACKLOC+3
  260.loop1        \Store graphics
  270LDA&320,X     \cursor on coord
  280STASTACKLOC,X \stack
  290INX
  300CPX#3
  310BNEloop1
  320STAprev_y
  330LDA#(STACKLOC+4)MOD256
  340STAstack    \Save location of
  350LDA#(STACKLOC+4)DIV256
  360STAstack+1  \coord stack
  370LDA&361
  380STApixels_per_byte
  390SEC
  400LDA#&80    \Save total number of
  410SBC&34E    \columns across screen
  420STAcolumn
  430LDA&314
  440PHA
  450LDA#9      \This OSWORD call
  460LDY#3      \is used to find
  470LDX#&10    \the colour of the
  480JSROSWORD \pixel at this point
  490LDA&360    \The parameter block i
s
  500AND#7      \at &310 and result is
  510STAtemp3  \returned at &314
  520CLC        \This result is added
to
  530ADC&314    \(?&360)AND7 so it can
  540TAY        \be used to index the
  550PLA        \colour tables in the
  560STA&314    \O.S ROM at table
  570LDAtable,Y \Load background colo
ur
  580STAback     \byte and store it
  590LDAcol1     \Load the first fill
  600AND&360     \colour
  610CLC         \Add "temp3" for offs
et
  620ADCtemp3   \for ROM table
  630TAX
  640LDAtable,X \Store colour byte fo
r
  650STAcol1     \first fill colour
  660LDAcol2     \Load the second fill
  670AND&360     \colour
  680CLC         \Add "temp3" for offs
et
  690ADCtemp3   \for ROM table
  700TAY
  710LDAtable,Y \Store colour byte fo
r
  720STAcol2     \second fill colour
  730LDAtype     \Shifts BIT 8 of "typ
e"
  740ASLA        \into the carry flag
  750AND#&7F
  760TAX
  770LDA#&FF           \Checks if BIT
8
  780BCCverical_lines \of "type" is s
et
  790LDA#&00           \and stores the
  800.verical_lines   \appropriate ma
sk
  810STAtemp3          \in "temp3"
  820LDAcol2
  830EORcol1
  840ANDtemp3
  850STAtemp3
  860LDAcol1   \AND first colour byte
  870ANDdata,X \with pattern data
  880STAtemp4
  890INX
  900LDAcol2   \AND second colour byt
e
  910ANDdata,X \with pattern data
  920ORAtemp4  \OR patterns together
  930BITtype
  940BVScross_hatching
  950STAcol1
  960.cross_hatching
  970EORtemp3
  980STAcol2
  990CMPback   \These tests are to ma
ke
 1000BNEstart_main_loop \sure that bo
th
 1010LDAcol1   \of the colours are no
t
 1020CMPback   \equal to the backgrou
nd
 1030BNEstart_main_loop \colour
 1040RTS          \If that is so, then e
nd
 1050.start_main_loop
 1060LDApointer
 1070BNEpointer_not_zero
 1080RTS          \End - pointer is zero
 1090.pointer_not_zero
 1100SEC
 1110LDAstack  \Decrement stack addre
ss
 1120SBC#4        \because coord is to b
e
 1130STAstack  \taken off coord stack
 1140BCSno_borrow1
 1150DECstack+1
 1160.no_borrow1
 1170DECpointer
 1180LDY#3
 1190.loop2
 1200LDA(stack),Y \Take top coord off
 1210STAX%,Y       \coord stack
 1220DEY
 1230BPLloop2
 1240JSRline   \Fill in current line
 1250LDX#3
 1260.loop3     \Save "lx" and "rx" to
 1270LDAlx,X   \preserve their values
 1280STAtemp_lx_and_rx,X
 1290DEX
 1300BPLloop3
 1310LDAscan_dir  \Load direction of
last scan (1=upwards,255=downwards,0=
first time)
 1320BNEnot_first_time
 1330JSRscanhi \Scan above current li
ne
 1340JSRscanlo \Scan below current li
ne
 1350JMPfinish_main_loop
 1360.not_first_time
 1370STAtype \Store direction (up/dow
n) of previous scan
```

```
 1380CLC     \Here the value of scan_
dir is added to "prev_y"
 1390ADCprev_y \Note that if 255 is a
dded it is the same as subtracting 1
(carry is not used)
 1400CMPY%
 1410BNErx_smaller_than_prev_rx
 1420CLC          \The carry is clear
ed
 1430LDAprev_lx   \so that "lx" + 1 i
s
 1440SBClx        \subtracted from
 1450LDAprev_lx+1 \"prev_lx" to test
if
 1460SBClx+1      \"lx" + 1 > "prev_l
x"
 1470BCClx_bigger_than_prev_lx
 1480LDAprev_lx   \"lx"<"prev_lx" so
 1490STArx        \the region between
 1500LDAprev_lx+1 \"lx" and "prev_lx"
 1510STArx+1      \is scanned in the
 1520LDA#&FE      \opposite direction
 1530JSRscan      \to the previous sc
an
 1540.lx_bigger_than_prev_lx
 1550JSRrestore_lx_and_rx
 1560CLC          \The carry is clear
ed
 1570LDArx        \so that "prev_rx"
+1
 1580SBCprev_rx   \is subtracted from
 1590LDArx+1      \"rx" to test if
 1600SBCprev_rx+1 \"rx" < "prev_lx" +
 1
 1610BCCrx_smaller_than_prev_rx
 1620LDAprev_rx   \"rx">"prev_rx" so
 1630STAlx        \the region between
 1640LDAprev_rx+1 \"rx" and "prev_rx"
 1650STAlx+1      \is scanned in the
 1660LDA#&FE      \opposite direction
 1670JSRscan      \to the previous sc
an
 1680.rx_smaller_than_prev_rx
 1690JSRrestore_lx_and_rx
 1700LDA#0   \Scan line in same dir
 1710JSRscan \as that of previous sca
n
 1720.finish_main_loop
 1730LDX#3        \Restore the values
 1740.loop4       \"lx" and "rx" and
 1750LDAtemp_lx_and_rx,X \store them
 1760STAlx,X      \in "prev_lx" and
 1770STAprev_lx,X \"prev_rx" for use
 1780DEX          \the next time
 1790BPLloop4     \through this loop
 1800LDAY%        \Store Y% in "prev_
y"
 1810STAprev_y    \for use next time
 1820JMPstart_main_loop
 1830.restore_lx_and_rx
 1840LDX#3
 1850.loop5
 1860LDAtemp_lx_and_rx,X
 1870STAlx,X
 1880DEX
 1890BPLloop5
 1900RTS
 1910 \This subroutine scans a line f
or
 1920 \runs of background coloured
 1930 \pixels and stores the first
 1940 \coord of each run on the coord
 1950 \stack
 1960.scan
 1970EORtype   \This tests whether th
e
 1980CMP#1     \line above or below t
he
 1990BNEscanlo \current line is scann
ed
 2000.scanhi   \Initiates scan above
 2010LDYY%
 2020INY          \If Y=0 then at top
of
 2030BEQend_scan \screen - end routin
e
 2040LDA#1     \Direction of scan -up
 2050BNEstart_scan
 2060.end_scan
 2070RTS
 2080.scanlo   \Initiates scan below
 2090LDYY%     \If Y=0 then at bottom
 2100BEQend_scan \of the screen -end
 2110DEY
 2120LDA#255   \Direction of scan -do
wn
 2130.start_scan
 2140STAscan_dir
 2150LDApointer
 2160STApat
 2170LDAY%
 2180STAtempy
 2190STYY%
 2200LDAlx
 2210STAX%
 2220LDAlx+1
 2230STAX%+1
 2240JSRaddress
 2250LDArx                 \Calculate th
e
 2260ANDpixels_per_byte \position of
 2270STAtemp1              \pixel in byt
e
 2280LDArx+1  \"rx" is the rightmost
 2290STAtemp3 \limit of the scan
 2300LDArx
 2310STAtemp2
 2320LDApixels_per_byte
 2330.not_in_range \The result of thi
s
 2340LSRtemp3      \shift is the colu
mn
 2350RORtemp2      \number of "rx"
 2360LSRA
 2370BNEnot_in_range
 2380.scan_loop
 2390LDA#&00       \Scan for next the
 2400JSRscan_line  \background pixel
 2410STXX%         \Calculate x-coord
 2420LDA#0         \from "X%" and sto
re
 2430STAX%+1       \it on coord stack
 2440LDApixels_per_byte
 2450.shift_left5
 2460ASLX%
 2470ROLX%+1
 2480LSRA
 2490BNEshift_left5
 2500CLC
 2510TYA
 2520ADCX%
 2530STAX%
 2540BCCno_carry5
 2550INCX%+1
 2560.no_carry5
 2570LDY#3
 2580.loop6  \Store "X%" on coord sta
ck
 2590LDAX%,Y
 2600STA(stack),Y
 2610DEY
 2620BPLloop6
 2630CLC          \Increment the addres
s
 2640LDAstack   \of the coord stack
 2650ADC#4
 2660STAstack
 2670LDAstack+1
 2680ADC#&00
 2690STAstack+1
 2700CMP#(STACKLOC+&200)DIV256
 2710BNEon1
 2720LDAcol1
 2730CMPback
 2740BNEon2
 2750PLA
 2760PLA
 2770.on2
 2780LDApat     \This limits the size
 2790STApointer \of the coordinate
 2800ASLA       \stack
 2810ASLA
 2820STAstack
 2830LDA#&00
 2840ADC#(STACKLOC)DIV256
```

→

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```
 2850STAstack+1
 2860LDYtempy
 2870STYY%
 2880RTS
 2890.on1
 2900INCpointer
 2910LDA#&80       \Scan for the next
 2920JSRscan_line \non-background pix
el
 2930JMPscan_loop
 2940.scan_line
 2950STAtemp5
 2960LDYtemp4
 2970JSRcreate_mask
 2980EOR#&FF
 2990JSRcreate_border_mask
 3000STAtemp3
 3010LDY#0         \Shift screen byte
 3020CPYtemp4      \until it is in the
 3030BEQscan_byte \position which
 3040.shift_left1 \corresponds to "X%
"
 3050ASLtemp3
 3060INY
 3070CPYtemp4
 3080BNEshift_left1
 3090.scan_byte
 3100CPXtemp2      \These two tests
 3110BCCtest_until_back_col \check if
 3120BNEstop_scan \"X%" > "rx"
 3130CPYtemp1
 3140BCCtest_until_back_col
 3150.stop_scan \Exit from scan
 3160PLA        \These bytes are pulled
 3170PLA        \to remove return addre
ss
 3180LDAtempy \of scan_line
 3190STAY%
 3200RTS
 3210.test_until_back_col
 3220BITtemp5
 3230BMItest_until_non_back_col
 3240LDAtemp3 \This sequence scans th
e
 3250AND&362  \bytes in the horizonta
l
 3260BEQend_scan_line \line until the
 3270ASLtemp3 \next pixel is a
 3280INY        \background pixel
 3290CPYpixels_per_byte
 3300BEQscan_byte \Testing here if
 3310BCCscan_byte \Y>pixels_per_byte+
1
 3320BCSnext_screen_byte
 3330.test_until_non_back_col
 3340LDAtemp3 \This tests until non-
 3350BEQnext_screen_byte \background
 3360AND&362              \pixel
 3370BNEend_scan_line
 3380ASLtemp3
 3390INY
 3400CPYpixels_per_byte
 3410BEQscan_byte \Tests if
 3420BCCscan_byte \Y>pixels_per_byte+
1
 3430.next_screen_byte
 3440LDYblock_line
 3450INX
 3460CLC        \Increase the screen
 3470LDAscreen \address to move onto
 3480ADC#8      \next byte to the righ
t
 3490STAscreen
 3500BCCno_carry2
 3510INCscreen+1
 3520.no_carry2
 3530LDA(screen),Y \Calculate modifie
d
 3540EORback         \value of next
 3550STAtemp3        \screen byte
 3560LDY#0
 3570BEQscan_byte  \Loop back
 3580.end_scan_line
 3590STYtemp4
 3600RTS              \Exit from scan
 3610 \This subroutine fills the
 3620 \current horizontal line left a
nd
 3630 \right from the current point
 3640 \until the first non-background
 3650 \coloured pixel in each directi
on
 3660 \The coordinates of both points
 3670 \are stored in "lx" and "rx"
 3680.line
 3690JSRaddress
 3700TXA
 3710PHA
 3720LDAblock_line
 3730AND#1
 3740TAY
 3750LDAcol1,Y \This is the pattern t
o
 3760STApat    \be stored on this lin
e
 3770LDYtemp4
 3780JSRcreate_mask \Create mask for
right side of byte containing "X%"
 3790EOR#&FF
 3800JSRcreate_border_mask
 3810BNEright_border
 3820LDA(screen),Y \Preserve left par
t
 3830ANDmask        \of byte not to be
 3840ORApattern    \filled and fill
 3850STA(screen),Y \the rest of byte
 3860LDA#&00
 3870STAmask
 3880LDYblock_line
 3890.fill_right
 3900INX
 3910CLC
 3920LDAscreen \Increase screen addre
ss
 3930ADC#8     \to move onto next byt
e
 3940STAscreen \to the right
 3950BCCno_carry3
 3960INCscreen+1
 3970.no_carry3
 3980CPXcolumn \Right edge of screen
?
 3990BEQat_screen_right
 4000LDA(screen),Y   \Fill line right
 4010EORback         \until there is
a
 4020BNEright_border \non-background
 4030LDApat          \pixel in the
 4040STA(screen),Y   \screen byte
 4050JMPfill_right
 4060.at_screen_right
 4070LDY#&00
 4080BEQstore_rx
 4090.right_border
 4100LDY#&00
 4110.shift_left2 \Calculate position
 4120BIT&362      \of non-background
 4130BNEat_right_border \pixel in
 4140ASLA         \screen byte
 4150INY
 4160CPYpixels_per_byte
 4170BNEshift_left2
 4180.at_right_border
 4190STYtemp5
 4200JSRcreate_mask \Create mask for
 4210EOR#&FF         \pixels up to
 4220ORAmask         \border
 4230STAmask
 4240EOR#&FF
 4250ANDpat          \Calculate patter
n
 4260STApattern      \for right border
 4270LDYblock_line
 4280LDA(screen),Y  \Store pattern in
 4290ANDmask         \border byte
 4300ORApattern
 4310STA(screen),Y
 4320LDYtemp5
 4330.store_rx \Calculate coord of "r
x"
 4340INY        \in internal coords
 4350STXrx      \(ie pixels)
 4360LDX#rx
 4370JSRcoord
 4380LDAX%        \Restore address of
 4390STAscreen \"X%" from the beginin
g
 4400LDAX%+1   \of subroutine
 4410STAscreen+1
 4420PLA
 4430TAX
 4440LDYtemp4
 4450JSRcreate_mask \Create mask for
left side of byte containing "X%"
 4460JSRcreate_border_mask
 4470BNEleft_border
 4480LDAmask        \Preserve right pa
rt
 4490AND(screen),Y \of byte not to be
 4500ORApattern    \filled and fill t
he
 4510STA(screen),Y \rest of the byte
 4520LDA#&00
 4530STAmask
 4540LDYblock_line
 4550.fill_left
 4560DEX
 4570SEC
 4580LDAscreen \Decrease screen addre
ss
 4590SBC#8       \to move onto next byt
e
 4600STAscreen \to the left
 4610BCSno_borrow2
 4620DECscreen+1
 4630.no_borrow2
 4640CPX#&FF   \At left edge of scree
n?
 4650BEQat_screen_left
 4660LDA(screen),Y   \Fill line left
 4670EORback         \until there is
 4680BNEleft_border  \non-background
 4690LDApat          \pixel in the
 4700STA(screen),Y   \screen byte
 4710JMPfill_left
 4720.at_screen_left
 4730INX
 4740LDY#&00
 4750BEQstore_lx
 4760.left_border
 4770LDYpixels_per_byte
 4780.shift_right1 \Calculate positio
n
 4790BIT&363        \of non-background
 4800BNEat_left_border \pixel in
 4810LSRA           \screen byte
 4820DEY
 4830CPY#&00
 4840BNEshift_right1
 4850.at_left_border
 4860INY
 4870STYtemp5
 4880JSRcreate_mask \Create mask for
 4890ORAmask        \pixels up to
 4900STAmask         \border
 4910EOR#&FF
 4920ANDpat          \Calculate patter
n
 4930STApattern      \for left border
 4940LDYblock_line
 4950LDA(screen),Y  \Store pattern in
 4960ANDmask         \border byte
 4970ORApattern
 4980STA(screen),Y
 4990LDYtemp5
 5000.store_lx \Calculate coord of "l
x"
 5010STXlx      \in internal coords
 5020LDX#lx
 5030JSRcoord
 5040SEC
 5050LDArx
 5060SBC#1
 5070STArx
 5080BCSno_borrow3
 5090DECrx+1
 5100.no_borrow3
 5110RTS
 5120 \This subroutine creates a mask
 5130 \which has the bits correspondi
ng
 5140 \to each pixel from the left of
 5150 \the byte set according to the
 5160 \value of the Y register
 5170.create_mask
 5180LDA#&00
 5190CPY#0
 5200BEQout
 5210.shift_right2
 5220LSRA
 5230EOR&362
 5240DEY
 5250BNEshift_right2
 5260.out
 5270RTS
 5280 \This subrountine creates mask
 5290 \and pattern bytes for screen
 5300 \bytes which are to be only
 5310 \partially filled
 5320 \It also loads the screen byte
 5330 \masking off the bits which are
 5340 \not to be filled
 5350.create_border_mask
 5360STAtemp3
 5370EOR#&FF
 5380STAmask
 5390LDAtemp3
 5400ANDpat
 5410STApattern
 5420LDYblock_line
 5430LDA(screen),Y
 5440EORback
 5450ANDtemp3
 5460RTS
 5470 \This subrountine calculates a
 5480 \screen address for the coord i
n
 5490 \"X%" taking into account the
 5500 \current screen graphics mode
 5510 \On exit from the subroutine
 5520 \"block_line" contains the numb
er
 5530 \of the character row which
 5540 \contains "Y%", the X register
 5550 \contains the column of "X%" an
d
 5560 \"temp4" contains the position
of
 5570 \the pixel within that column
 5580.address
 5590LDA#&FF \The Y-coord is reversed
 5600EORY%   \moving the position of
 5610PHA     \origin to the top left
 5620AND#7
 5630STAblock_line
 5640PLA
 5650LSRA
 5660LSRA
 5670ORA#1
 5680TAY
 5690LDA(&E0),Y \Look up the 640
 5700STAtemp1   \multiplication table
 5710DEY        \in the OS ROM to fin
d
 5720LDA(&E0),Y \address of character
 5730STAtemp2   \row of coord
 5740LDA#&4  \Check if the graphics
 5750AND&355 \mode is mode 4 or mode
5
 5760BEQnot_mode_4_and_5
 5770LSRtemp2 \This is because in mod
es
 5780RORtemp1 \4 & 5 there are only 3
20
 5790.not_mode_4_and_5 \bytes per lin
e
 5800CLC
 5810LDAtemp1 \This adds on the addre
ss
 5820ADC&350  \of the top left corner
 5830STAtemp1 \of the screen
 5840LDAtemp2
 5850ADC&351
 5860CMP#&80 \This checks if address
```

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→

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```
 5870BCCaddress_less_then_RAM_top
 5880SEC     \is bigger then &8000
 5890SBC&354 \(ie in ROM)
 5900.address_less_then_RAM_top
 5910STAtemp2
 5920LDApixels_per_byte \Position of
 5930ANDX%                \pixel within
 5940STAtemp4             \screen byte
 5950LDApixels_per_byte
 5960.shift_right3 \Shift "X%" into t
he
 5970LSRX%+1        \range of 0 to 79
 5980RORX%          \for modes 0,1,2
 5990LSRA           \or range 0 to 39
 6000BNEshift_right3 \for modes 4,5
 6010LDXX% \Column number of "X%"
 6020TXA
 6030ASLA    \This sequence of bytes
 6040ROLX%+1 \multiplies "X%" by 8
 6050ASLA    \to get it to correspond
 6060ROLX%+1 \address offset for the
 6070ASLA    \coloumn number within
 6080ROLX%+1 \that line
 6090STAX%
 6100CLC       \This sequence adds
 6110LDAX%     \together the value
 6120ADCtemp1  \just calculated and
 6130STAscreen \the address calculate
d
 6140STAX%     \at the begining of th
e
 6150LDAX%+1   \subroutine
 6160ADCtemp2
 6170STAscreen+1
 6180STAX%+1
 6190RTS
 6200 \This subroutine forms a X-coor
d
 6210 \using the value contained in t
he
 6220 \zero page address specified by
 6230 \the X register. The address th
at
 6240 \is calculated is stored in tha
t
 6250 \zero page location
 6260.coord
 6270LDA#0
 6280STA&01,X
 6290LDApixels_per_byte
 6300.shift_left4
 6310ASL&00,X
 6320ROL&01,X
 6330LSRA
 6340BNEshift_left4
 6350CLC
 6360TYA
 6370ADC&00,X
 6380STA&00,X
 6390BCCno_carry4
 6400INC&01,X
 6410.no_carry4
 6420RTS
 6430.data
 6440]
 6450RESTORE
 6460FORN%=0TO7
 6470READDAT
 6480?P%=DAT:P%=P%+1
 6490NEXT
 6500REM These bytes are the mask byt
es
 6510REM used to create the pattern
 6520REM which is stored on the scree
n
 6530DATA&FF,&00,&AA,&55
 6540DATA&99,&66,&C3,&3C
 6550NEXT
```

Program II

```
   10REM
   20REM DEMO1
   30REM By Stephen Austin
   40REM (c) The Micro User
   50REM
   60?&226=0:?&227=&12
   70MODE2
   80VDU23,1,0;0;0;0;
   90GCOL0,2:MOVE0,256:DRAW1279,256
  100GCOL0,7
  110REM square part of house
  120MOVE300,256:PLOT1,680,0:PLOT1,0,
400:PLOT1,-680,0:PLOT1,0,-400
  130REM roof
  140MOVE300,656:PLOT1,340,174:PLOT1,
340,-174
  150MOVE500,760
  160PLOT1,0,60:PLOT1,40,0:PLOT1,0,-4
2
  170PROCfill(1,0,1,520,800)
  180REM door
  190MOVE590,256:PLOT1,0,190:PLOT1,10
0,0:PLOT1,0,-190
  200MOVE570,256:PLOT1,0,200:PLOT1,14
0,0:PLOT1,0,-200
  210?&8C=3:?&8D=3:?&8E=0:PLOT97,-10,
4
  220?&8C=4:?&8D=3:?&8E=0:PLOT97,-70,
4
  230REM windows
  240PROCwindow(364,320)
  250PROCwindow(780,320)
  260PROCwindow(364,500)
  270PROCwindow(780,500)
  280PROCwindow(572,500)
  290PROCfill(1,1,0,640,460)
  300PROCfill(1,1,1,300,256)
  310PROCfill(1,3,1,640,820)
  320PROCtree(140,256)
  330PROCtree(1132,256)
  340PROCsun
  350PROCfill(4,6,0,640,860)
  360REM fill in grass
  370GCOL0,2
  380FORN%=1TO8
  390MOVEN%*160,255:DRAW(N%-4)*240+64
0,0
  400NEXT
  410FORN%=0TO3
  420PROCfill(2,3,0,N%*320+20,250)
  430PROCfill(3,6,0,N%*320+100,250)
  440NEXT
  450REPEATUNTILINKEY(0)<>-1
  460END
  470DEFPROCwindow(X%,Y%)
  480MOVEX%,Y%:PLOT1,140,0:PLOT1,0,10
0:PLOT1,-140,0:PLOT1,0,-100
  490MOVEX%,Y%:PLOT0,30,0:PLOT1,0,100
  500?&8C=5:?&8D=5:?&8E=0:PLOT97,-10,
-8
  510MOVEX%,Y%:PLOT0,110,0:PLOT1,0,10
0
  520?&8C=5:?&8D=5:?&8E=0:PLOT97,10,-
8
  530?&8C=6:?&8D=7:?&8E=0:PLOT97,-20,
0
  540ENDPROC
  550DEFPROCtree(X%,Y%)
  560GCOL0,2
  570MOVEX%,Y%:PLOT1,0,50:PLOT1,-65,0
:PLOT1,75,200:PLOT1,75,-200:PLOT1,-65
,0:PLOT1,0,-50:PLOT1,-20,0
  580?&8C=2:?&8D=2:?&8E=0:PLOT97,10,1
50
  590ENDPROC
  600DEFPROCsun
  610GCOL0,3
  620MOVE1175,900:FORD%=0TO360STEP30:
DRAWCOS(RAD(D%))*75+1100,SIN(RAD(D%))
*75+900:NEXT
  630PROCfill(1,3,0,1100,900)
  640ENDPROC
  650DEFPROCfill(C1,C2,P,X%,Y%)
  660REM C1 and C2 are the two colour
s. p is the pattern type. X% and Y% a
re the coordinates of the point insid
e the region to be filled.
  670?&8C=C1:?&8D=C2:?&8E=P:PLOT101,X
%,Y%
  680ENDPROC
```

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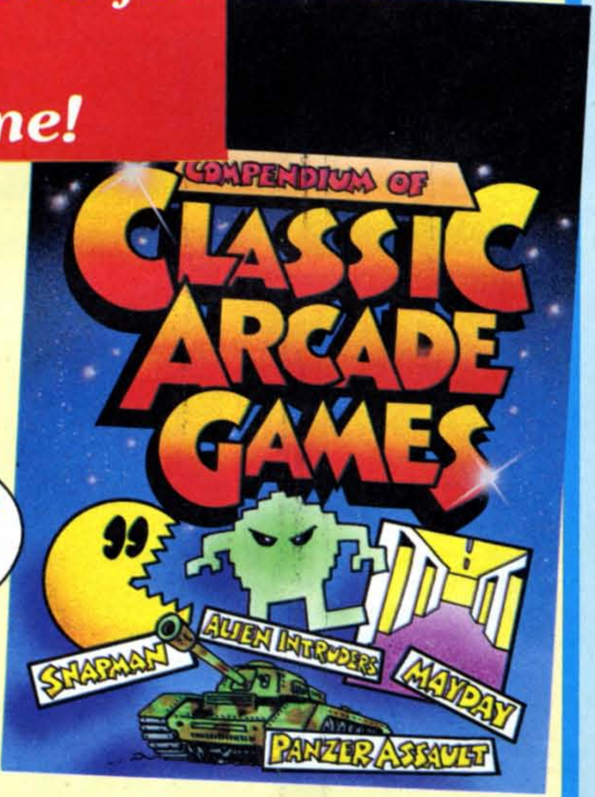
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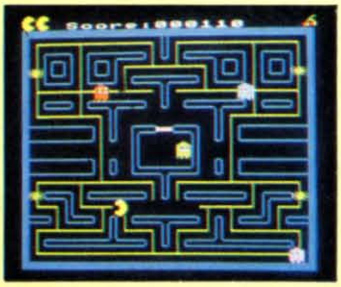
Score:000110

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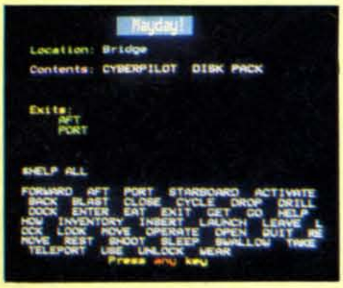

```
Mayday!
Location: Bridge
Contents: CYBERPILOT  DISK PACK

Exits:
    AFT
    PORT

#HELP ALL

FORWARD  AFT  PORT  STARBOARD  ACTIVATE
 BACK  BLAST  CLOSE  CYCLE  DROP  DRILL
 DOCK  ENTER  EAT  EXIT  GET  GO  HELP
HOW  INVENTORY  INSERT  LAUNCH  LEAVE  L
OCK  LOOK  MOVE  OPERATE  OPEN  QUIT  RE
MOVE  REST  SHOOT  SLEEP  SWALLOW  TAKE
 TELEPORT  USE  UNLOCK  WEAR
              Press any key
```

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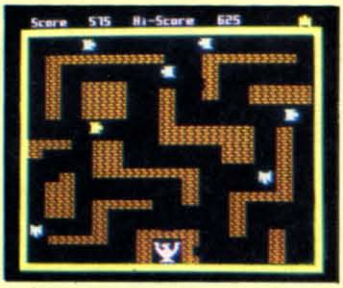
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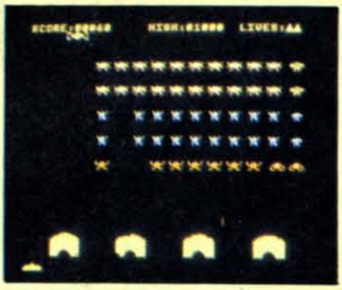
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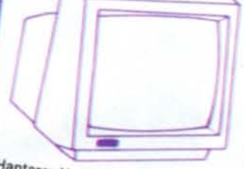

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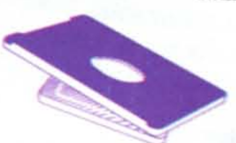

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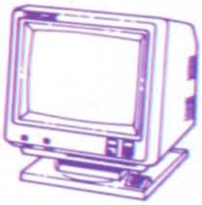

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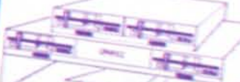

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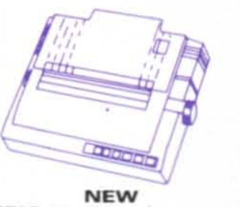

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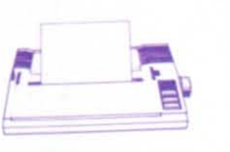

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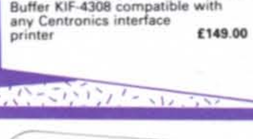

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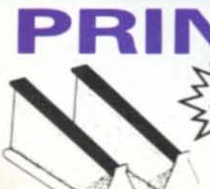

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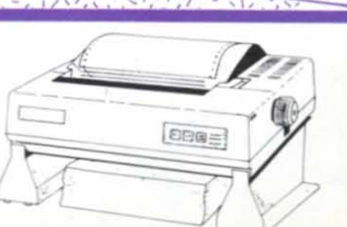

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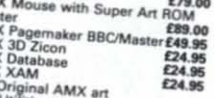

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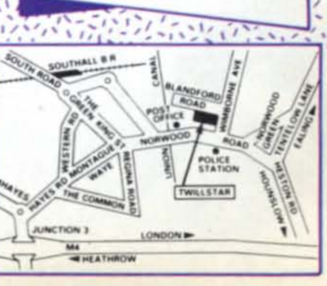

£10 Prize letter

Catching and curing the bugs in Basic II

IN response to the letter in the October issue of The Micro User *about Basic II rom bugs, may I elaborate on the bug.*

If Iain Tatch had omitted line 10 from his program (which contained a RESTORE statement) the program with the correct DATA statement would still have worked.

The programs with the corrupt DATA statement (those with PRINT, or nothing, instead of DATA) would have failed with an Out of DATA error, as he would have expected.

They would also have failed as expected if he had changed the RESTORE statement to point to a different line, which did not contain any commas (such as line 10).

What Iain has stumbled upon is a combination of a bug in the RESTORE command, and one of the undocumented features of the READ and DATA commands.

I came across these while researching my Basic Analyser, though omitted the details from the articles for reasons of space (see The Micro User, *Oct/Nov/Dec 1985).*

First, the undocumented features. DATA statements can contain expressions to be EVALuated.

But because the DATA statement is not tokenised (unlike the argument for EVAL), you cannot use an expression such as SIN(x) – it gives an Array error.

DATA statements can also contain comments after each number.

Thus a statement like the following would be perfectly legal in Iain's program:

```
100 DATA 12 (a dozen), A*
A (lets see a dozen dozens)
, 0
```

How does it work? Basic maintains a DATA pointer which points to the character following the last item of DATA that has been READ. Note that when a program starts, it points to the first byte of the program, which is a carriage return.

When a READ is executed, the DATA line is searched for a comma, starting at the DATA pointer. The next item of DATA is READ immediately following this next comma, if found.

This means that when READing a list of numbers you can follow each one with a comment without causing an error.

If the end of the line is reached a search is made, line by line, until another line starting with a DATA token is found.

The DATA pointer is then set to point at this token, which is treated as if it were a comma in the DATA list, as the READ is executed.

Now to explain the bug. In Basic II, and Electron Basic, a RESTORE updates the DATA pointer to point to the first character of that line, whether or not it is a DATA token.

The next time a READ is performed, the RESTOREd line is searched for the next comma (or an initial DATA token).

Anything found after a comma in the line is taken as the DATA to be READ, whether the RESTOREd line was a DATA one or not.

In Basic IV this bug has been corrected. RESTORE adjusts the DATA pointer to point instead at the carriage return preceding the required line.

Thus when the next READ is executed, it finds that the DATA pointer is at the end of a line, and so search is made for the next line starting with a DATA token. – **Mike Stallybrass, Areley Kings, Stourport-on-Severn, Worcs.**

Win a tenner

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the three most interesting letters will each receive a £10 prize.*

No luck loading

SOME games will not load on my BBC Micro. We have had it checked and have used several different tape recorders, but so far we have found nothing wrong.

It is a standard BBC B with OS 1.2, Basic II and issue 7 mother board.

The games which refuse to load all have continuous data streams and include Fortress, Knight Lore, Way of the Exploding Fist, Caveman Capers and Castle Quest.

Do you know what could be wrong? – **Gary Betts, Lancing, Sussex.**

● There are two types of serial ULA fitted to BBC Micros. Unfortunately there are problems loading some software on one of these types.

Your Acorn dealer should be able to fix you another ULA, or the appropriate software house give you a version of the game that works with your present ULA.

Unfair advantage

I WAS very angry to see that The Micro User *has published M. Gower's Karate Combat cheat program. I spent many hours playing the game before I completed it.*

What makes me more angry is the fact that the competition is still open, so anybody with a copy can cheat and have a chance to win the prizes.

I thought The Micro User *would have had more sense and waited until after the closing date of the competition.* – **Matthew Hall, Ripley, Derbys. age 13.**

● Unfortunately, any competi-

→

More facts on Beebaid

I AM writing regarding the review of our Beebaid product in the October issue of The Micro User *to outline just some of the facilities which the reviewer omitted to mention.*

Firstly, the Load menu is intelligent, automatically determining the type of file you are attempting to load.

This applies particularly to roms, Basic and machine code programs, and teletext screens. Other data files cause the program to ask what to do with the file, such as type it or dump it. When it detects a rom, it prompts for a destination ram socket.

*From the Load menu you can enter *INFO, *DUMP, *TYPE, *EXEC, *DELETE, *LOAD, LOAD, *RUN or CHAIN using a single keystroke. Beebaid users never need to key these commands in full. Files can be locked and unlocked using Control+L and Control+U.*

There is a Copy menu which enables one or more files to be tagged and then copied to another drive by hitting the destination drive address key. This is invaluable when doing selective disc file backups.

Beebaid handles single and multiple sideways rams, both software and hardware controlled, and the Beebaid Run menu works on all models and is fully 6502 second processor compatible.

Incidentally, the Disc Indexing System is supplied free with the Beebaid rom. Full technical details are available from Jaysoft. – **J.W. Bishop, West Wickham, Kent.**

From Page 153

tion is open to cheats. Although you feel that our program helps the cheats, our opinion is that if we had not published it, those few who had access to it would have had an unfair advantage over those who hadn't.

By publishing the program, everyone was brought back to the same level.

Driven to distraction

I HAVE discovered a way of cheating at Acornsoft's game Revs.

I was recently driving around the track backwards when something suddenly occurred to me.

How did the author determine whether the car I was driving had in fact done a whole lap before crossing the finish line and gaining a time?

I then set about testing out the program by going up to each corner, performing 180 degree skids and going back the other way. This is how to cheat.

First of all, when in practice mode drive from your stationary position as fast as you can until you reach the 3rd gear corner, Becketts (refer to map if necessary).

Now slam down the brakes and perform a 180 degree spin – this may take some practice.

Head off in the direction you came from and as soon as you pass the start/finish line perform another 180 degree spin.

You should now be facing in the normal direction and be able to slam the car into 1st gear, gaining as much wheel spin as possible to sprint across the line.

Once you are confident in practice try it in competition mode to get an amazing qualifying time. However, you must watch out for oncoming cars when going back the other way.

I have a recorded time of 0.58.2 seconds. Can any readers do better? – **P. Stout, Stubbington, Fareham, Hamps.**

Graphics dump help

THE Mode 7 screen dump program in the September issue of The Micro User *looks useful, but I cannot get the graphics to dump correctly from my Master. Can you offer any help?* – **Wilf Spurling, Brixham, Devon.**

● On the Master Welcome disc you will find a program called Convert. Run this before you run the Mode 7 dump and you should have no further problems.

Convert makes the Master act more like a Model B, so you may find it useful with other software that has so far failed on your micro.

Witch hunt for variables

HAVING spent the past two days keying in Witch Hunt from the October issue of The Micro User, *imagine my disappointment when I found that the program would not run.*

The problem seems to be in the following line:

```
90 HIMEM = &5400 : FOR A
=&5600 TO &57FF:READ B:?A=B
:NEXT
```

On trying to run the program the computer reports that there is no such variable at line 90.

Please could you advise me whether this is a printing error, or what mistakes I might have made?

Also, is this program compatible with the BBC model B computer, and is there enough memory to run it?

Finally, do I have to be a subscriber before I can buy this program from your mail order offers? I fear that this might be the only option available to me. – **Carolynne Woffington, Woodley, Reading, Berks.**

● There are no mistakes in the listing, and you have typed line 90 correctly. The "no such variable" is caused by the READ B trying to read something that doesn't exist, so check the DATA lines starting at 110.

Check especially that you have not entered letters instead of numbers (I and O especially). If you type:

```
PRINT A-&5600
```

after the error occurs, the response is the number of data items read correctly. Start counting the data from line 110 and you should find your error more easily.

This program will run on all models without memory problems and, like all our tapes and discs, is available to anyone. You will find an order form on Page 167.

Making the most of Thrust

£10 Prize letter

HERE are some tips on Superior Software's Thrust.

On the first three sheets the reactor is found on the planet's surface and on the fourth sheet it is just below. It is definitely a good idea to destroy the reactor on these sheets.

Certainly on the first three it is very easy to carry out this task and provide new lives with which you can tackle further sheets.

In fact if you destroy all the limpet guns, collect all the fuel tanks and pods and destroy all the reactors on the first three sheets you obtain a score of 21600, five lives and fuel over 2000.

This status is easy to obtain as to destroy a reactor you need only 15-20 shots at it and of course you can give it a good bashing before you have collected the pod.

In playing the game the pod is your biggest manoeuvring handicap, especially in cornering. I think I have found the safest method of steering round a sharp corner with the pod.

Approach the corner slowly and hover. This is achieved by sending out short bursts of downward thrust.

If it is a right hand corner cease hovering when your pod has swung as far left as it can go: vice versa for left hand corners. When you are satisfied with the position of your pod turn your nose into the corner and give a hard thrust.

When you are out of the bend hover in the nearest wide space. Let your pod swing until it is not dragging you around and then continue up the tunnel.

You will find the first corner of this type on the third sheet.

On reverse gravity planets a given amount of thrust will move you further than in normal gravity.

If you are a beginner in Thrust and want to try the sheets further on in the game you can easily get to the fourth and maybe even fifth. All you have to do is shoot the reactor to a critical stage and escape with no pod.

Your mission will have failed, but you will progress on to the next sheet without losing a life.

Finally, when on invisible planets, if possible do not destroy the limpet guns in the tunnels because the base of each limpet gun indicates both the position and angle of the tunnel wall.

Good luck all you Thrusters out there – may the pod be with you. – **Ian Colvin, Stanmore, Middlesex.**

Mistaken identity

I NOTED in the September isssue of The Micro User *that the spelling of Carnot was incorrect.*

Carnot was a French physicist who gave his name to the Carnot cycle – to do with heat engines. The person I presume was intended here is Karnaugh – **Chris Butlin, Dunstable, Beds.**

● I always thought it was spelt with a K, but everyone said I was wrong. Maybe now they'll believe me. – Mike Cook

Command corrections

IT has come to my attention that some readers who typed in Listing II from my Printer commands article in the November issue of The Micro User *may have had problems getting it to work correctly.*

The routine was added by

someone else and, unfortunately, will fail on a few systems.

*Firstly, tape users should alter line 10 to read *RUN PRINTER rather than just *PRINTER. Secondly, the routine as it stands will not work at all on machines with Basic I. A new line:*

```
500 DEFPROCos(N) : $&700=
A$(N):X%=0:Y%=7:CALL &FFF7:
ENDPROC
```

is required, and line 70 should be altered to read:

```
70 PROCos(I):PROCos(J)
```

Of course the program is only a short demonstration routine, and neither of these errors will affect the correct functioning of the main program (Listing I). – **Jonathan Temple, Chilwell, Beeston, Nottingham.**

Hashes and pound signs

£10 Prize letter

FOLLOWING I.P. Wright's letter in the September issue of The Micro User *concerning the printing of a pound sign, I wrote a short program which may be of interest to him or others with a similar problem.*

A pound sign going to the printer is intercepted and replaced with the code for a hash sign. This is similar to the Wordwise command DP35.

However, whereas Wordwise displays a hash on the screen, my program retains the display of a pound which the printer produces.

The program intercepts the oswrch routine through the vector at &20E and &20F. It then checks that the code in question is a pound. It also checks that the output to the printer is enabled with VDU 2.

If both conditions apply a VDU 1,35 is executed and a pound sign is printed. The printer is then switched off, a pound sign displayed on the screen and the printer re-enabled.

The program was written on a disc machine, but will still work with a tape filing system. The code may be easily moved if desired by altering lines 80, 490 and 500. – **Nigel Reed, Langford Budville, Somerset.**

```
   10 REM Printer '£' sign
replacer.
   20 REM(c) The Micro User
   30 REM     by Nigel Reed
   40 osbyte=&FFF4
   50 oswrch=&E0A4
   60 char=&80
   70 FORpass=0 TO 3 STEP 3
   80 P%=&1200
   90 [ OPT pass
  100 \ Store acc and push
registers
  110 STA char
  120 TXA:PHA
  130 TYA:PHA
  140 \ Is character a £?
  150 LDA char
  160 CMP #ASC("£")
  170 BNE end
  180 \ Is printer on ?
  190 LDA #&75
  200 JSR osbyte
  210 TXA
  220 AND #1
  230 BEQ end
  240 \ Print £ on printer
only
  250 LDA #1
  260 JSR oswrch
  270 LDA #ASC("£")
  280 JSR oswrch
  290 \ Print £ on screen
only
  300 LDA #3
  310 JSR oswrch
  320 LDA #ASC("£")
  330 JSR oswrch
  340 LDA #2
  350 JSR oswrch
  360 PLA:TAY
  370 PLA:TAX
  380 LDA char
  390 RTS
  400 \ If printer off and
char not £
  410 .end
  420 PLA:TAY
  430 PLA:TAX
  440 LDA char
  450 JSR oswrch
  460 RTS
  470 ]
  480 NEXT
  490 ?&20E=&00
  500 ?&20F=&12
  510 END
```

Coming up empty handed

AFTER seeing your last month's poke for Karate Combat by Superior Software, I have found a way to beat your opponent in a competition with the computer without him laying a finger on you.

All you have to do is play in a double player game and when you have finished press Escape and then play against the computer in a competition.

This time your computer opponent will not strike you unless someone controls him on the keyboard or another joystick, so you can hit him until he gets knocked down. – **C.C. Wong, Hampton, Middx.**

Immortal adventuring

ABOUT two weeks ago I got Bruce Lee from US Gold and after a few days I accidentally managed to get never-ending lives. I eventually managed to work out the following solution.

Collect all the lanterns on the top three levels, then go down to the next level through the gap on the middle level, which remains closed until you have collected all the lanterns on the top.

Make your way to the bottom of the screen, collecting all the lanterns on the way, but watch out for the green yamo as he often gets you when you're falling down a gap.

Now go left to the next screen and climb up the waterfall, watching out for the spikes when you get to the top. Don't worry about our friend Mr. Yamo, because the spikes will get him when he gets to the top.

Once on the platform, jump right when the fireball is at the end and you should quickly be back at the bottom.

Next do the same on the left. If you time it right you should be at the bottom at the other end of the waterfall.

Go left, climb up the ladder and walk left off the edge when the fireball is about to cross. You should find yourself in a room with lots of fires in it.

Now the fun and games really start. Go right collecting the lanterns, avoiding being kicked by Mr. Yamo and avoiding the fires.

Then drop off the edge and go left, collecting the rest of the lanterns before going right on to the next screen.

Keep getting yourself killed until it says FALLS 01, then go down, get the lantern and go left to the next screen. As you will notice, this is the screen with the fires but lower down.

Don't go left and get the lanterns – go right and kill yourself on the spike on the right screen.

You will be thrown into the left screen and provided your fall said 01, you will have infinite lives with which to complete the rest of the game. – **Wayne Joyce, Birstall, Leicester.**

Five-year-old favourite

I WOULD like to say how much my five year old son enjoyed Rock Fall, the extra game on August's The Micro User *disc.*

Using the built-in screen editor I have been able to design very simple screens – ideal for

→

From Page 155

the young beginner.

I enclose a photograph showing his favourite screen which has his name on it. – **B. Bracegirdle, Stockport, Cheshire.**

Sound of music

THE dreadful music in The Way of the Exploding Fist has been driving me mad.

All the reviews said there was no sound off option, but I've struck on the solution.

When in demo mode press Delete – quickly or else the sound comes back on again. To switch on press Delete again. – **M. Downer, Shipton-under-Wychwood, Oxon.**

Program protection

RECENTLY I have written a program which I want to sell. On some programs such as Way of the Exploding Fist the disc is protected so you can't even catalog it.

Is it easy to do that to any disc? If so, please could you let me know how to do it. – **Christopher Ewels, Ford Heath, Shrewsbury, Shropshire.**

● Protecting discs well requires a lot of programming skills. However, just preventing the catalog from being displayed is quite easy.

On Acorn DFS format discs the first 8 bytes of the title are stored in sector 0 on track 0. If you use a sector editor such as the one by Kevin Edwards in the August 1984 issue of *The Micro User* you can make the title anything you want.

VDU 21 switches the VDU drivers off, so use the editor to change the first byte of the title to 21 (&15), and the drivers will switch off as soon as the title is displayed, thus preventing the catalog being printed.

If you then give your programs strange names, people will have trouble finding them.

You can also change another of the title bytes to 3 if you want to prevent the catalog being output to a printer.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Confessions of a faint-hearted Micro User

Requiem for a programmer

Dear Trev,

You know that I'm not one to moan, that grin and bare it (is that spelt right?) has always been my motto. Well things are getting on top of me. Well, one thing. Doreen.

It was her fault that I went to the Model B Requiem (written on a Music 500, no flowers just donations – in lire – to Acorn). I wouldn't have heard of it if she hadn't rung up asking me to write a program.

"Can you do me a program that takes all the names of our teachers and picks five at random?" she asked.

"Of course I can, but why?"

"The staff at our school are doing a sponsored parachute jump to raise funds".

"What for?"

"A parachute for the next one. Make sure that the program doesn't pick me and I'll see you at the Requiem".

Now all would have been well except for the fact that Clive had called round earlier in the day and mentioned the Rogues' little "do" to Andrea. As she was suffering from a bout of bellringer's elbow – occasioned by fighting her way to the bar at the Quaasimodo's Revenge (so named because the beer's so bad the customers get the hump) – she decided to come along.

Picture the scene. Me, upstairs at the Ram and Buffer with Doreen on one side and A. on the other. It was like being sat between the Pope and Ian Paisley but with less of the good fellowship. "This is Doreen", I stammered by way of introduction. "She's a teacher and is very good with Masters".

"So I've been told", said A. in a voice that reminded me of the bottles of concentrated nitric acid in my old school lab.

"It's so nice you could come", replied Doreen in a voice that made Margaret Thatcher sound sincere, "I believe you've been having problems with pulling things".

"You mean my bellringer's elbow?"

"Elbow? No. Someone mentioned something about mammals in your bell-tower".

And that's how the repartee went for the rest of the evening. I tried to pay attention to the Requiem but couldn't with dialogues going on like:

"Do you program, Andrea?"

"No. I'm like Bob in that respect".

Not that it wouldn't have been an interesting evening if I'd had the chance to pay attention. During the interval they had one of the Squirrel User writers speaking about Structured Programming. He'd been sent by way of punishment as he was in disgrace for writing an article that people could follow. I didn't understand all of it but some points remain clear.

Apparently you shouldn't start typing right away but think about what you're doing first. (If I thought about it I'd never do it.) Also you get all sorts of nasty bugs from flow charts. And you should write it all down in pseudo-code first – hence the Rogue's new catch-phrase, "Show us your pseudycode, sweety". And it helps if you don't try to do it all at once but break it down into parts that you can manage. "I tell Bob that all the time", A. purred to Doreen.

"I always thought he was perfectly structured", came the alarming reply.

I can't remember too much after that as things became a bit tense. Two pints of the Ram and Buffer's speciality ale, Ewe Name-it, had its usual effect but I didn't dare leave them alone together. And it seemed inappropriate to GOTO anywhere considering the subject being talked about.

However, I seem to recall something about "passing parameters" which didn't help in my state and also there was something about local variables which the landlord objected to as he thought it was a dig at his pub grub. The worst bit was when the speaker held up a program that he said was the most unstructured he'd ever seen. And, of course, it was one of mine. Apparently that was why Clive had called round earlier. I will say no more. I just wish everyone else would do the same.

Yours unstructuredly,

Bob

PS Doreen bought me a present at the Requiem – a badge that says "Structured programmers do it top down". I've bought her a tastefully illustrated copy of "The Joy of Programming".

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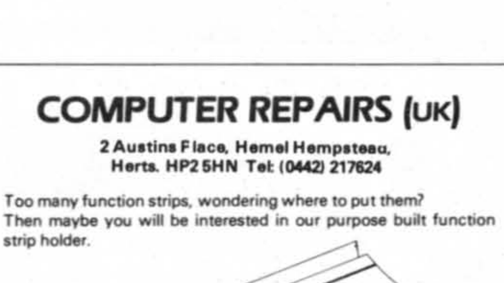

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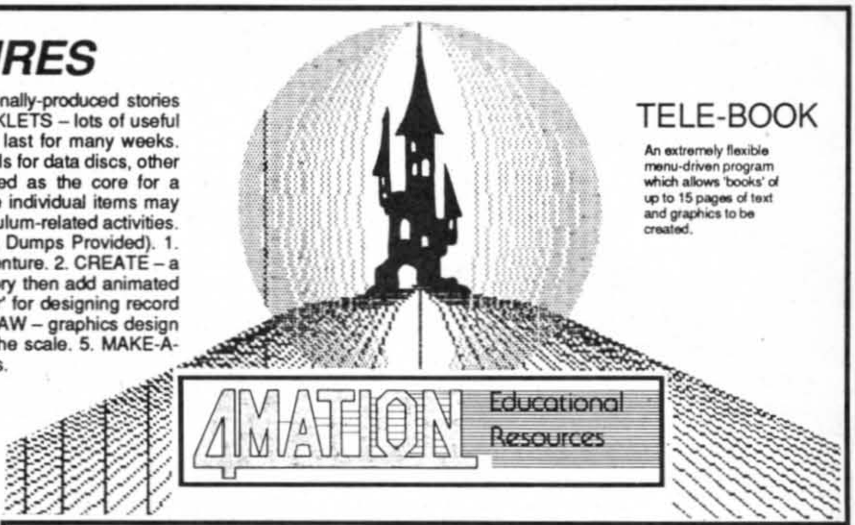

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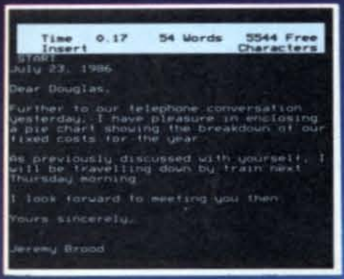


```
Time    0.17    54 Words   5544 Free
Insert                    Characters
START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year.

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning.

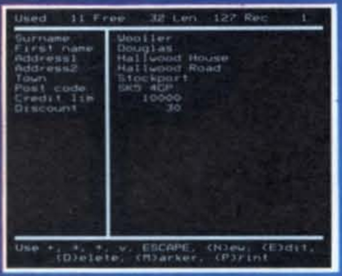
I look forward to meeting you then.

Yours sincerely,

Jeremy Brood
```

WORD PROCESSOR

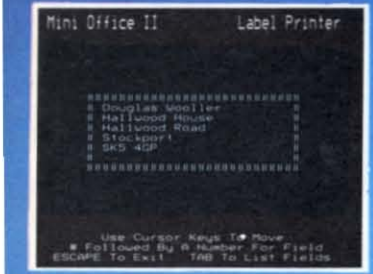
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



```
Used   11 Free   32 Len  127 Rec     1
Surname        Wooller
First name     Douglas
Address1       Hallwood House
Address2       Hallwood Road
Town           Stockport
Post code      SK5 4GP
Credit lim        10000
Discount             30
Use +, +, +, v, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE

Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II            Label Printer

     ##############################
     #  Douglas Wooller           #
     #  Hallwood House            #
     #  Hallwood Road             #
     #  Stockport                 #
     #  SK5 4GP                   #
     #                            #
     ##############################

        Use Cursor Keys To Move
    # Followed By A Number For Field
  ESCAPE To Exit    TAB To List Fields
```

LABEL PRINTER

Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

70
60
50
40
30
20
10
0
J F M A M J J A
PRODUCTION COSTS
CUB
DATABASE SOFTWARE
Mini
Office
Mini Office II
Main menu
(c) Database Software 1986

...and at a price

Mini Office II offers the most comprehensive, integrated suite of programs ever written for the BBC Micro – making it the most useful productivity tool yet devised.

A team of leading software authors were brought together to devote a total of 26 man years of programming to the development of Mini Office II. What they have produced is a package that sets new standards in home and business software.

The sample screenshots above illustrate just a few of the very wide range of features, many of which are usually restricted to software costing hundreds of pounds. Most are accessed by using cursor keys to move up and down a list of options and pressing Enter to select.

Is it that easy to use? Several leading reviewers have already sung its praises on this very point.

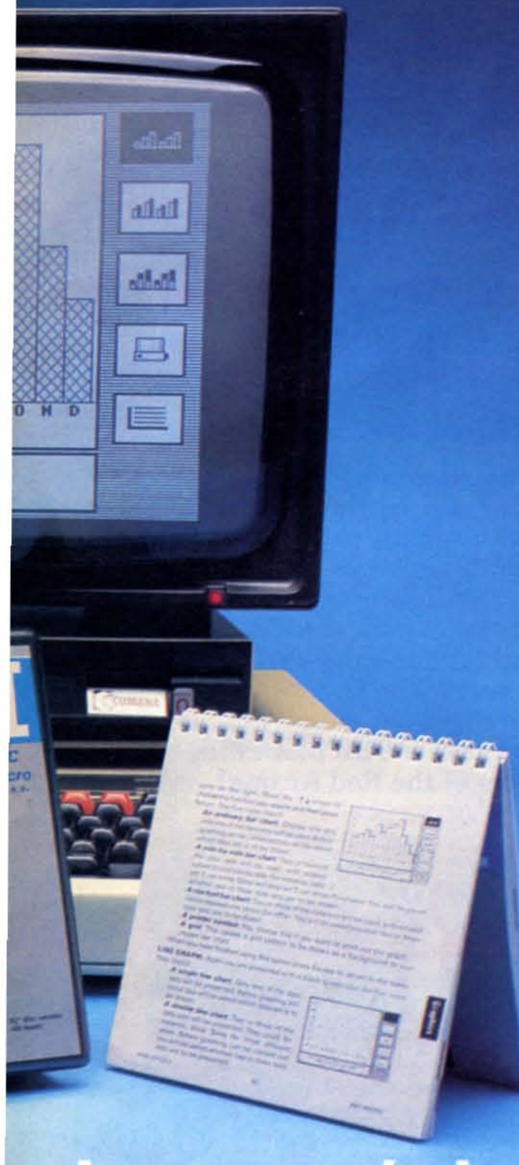
Yet possibly the best advertisement for Mini Office II is that it comes from the same stable that produced the original Mini Office package back in 1984.

That was so successful it was shortlisted in two major categories of the British Microcomputing Awards – the Oscars of the industry – and sold in excess of 100,000 units!

It was up to Mini Office II to take over where the first Mini Office left off, with 32 extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, very easy to follow manual.

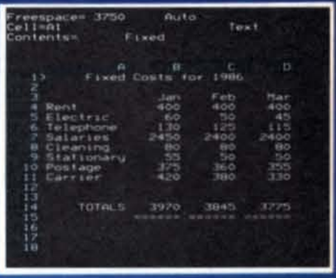
This is the package thousands of BBC Micro owners have been waiting for – and at a price everyone can afford!

ONE package!



SPREADSHEET

Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!

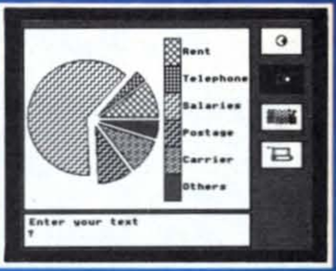


```
Freespace= 3750     Auto
Cell=A1                       Text
Contents=      Fixed

            A         B         C         D
 1>      Fixed Costs for 1986
 2
 3                   Jan       Feb       Mar
 4 Rent              400       400       400
 5 Electric           60        50        45
 6 Telephone         130       125       115
 7 Salaries         2450      2400      2400
 8 Cleaning           80        80        80
 9 Stationary         55        50        50
10 Postage           375       360       355
11 Carrier           420       380       330
12
13
14      TOTALS      3970      3845      3775
15               ======== ======== ========
16
17
18
```

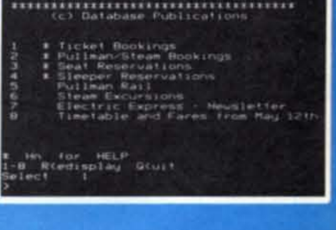
GRAPHICS

Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



COMMS MODULE

Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!



```
>br

****************************************
        British Rail Service
    Tickets  / Fares  / Timetable
****************************************
     (c) Database Publications


1    * Ticket Bookings
2    * Pullman/Steam Bookings
3    * Seat Reservations
4    * Sleeper Reservations
5      Pullman Rail
6      Steam Excursions
7      Electric Express - Newsletter
8      Timetable and Fares from May 12th


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select     1
>
```

that can't be matched!

Here's what some independent reviewers say about Mini Office II:

Menus throughout the program were abundant and well structured, allowing complex choices to be made with hardly a glance at the pocket-sized spiral-bound manual, and offering a wealth of user-defined functions . . . For the money it really is unbeatable. Dedicated word processors, spreadsheets and comms packages may offer some extra facilities, but some are so full of whistles and bells you may find yourself forever in the manual or even not using half of their power. What you get with Mini Office II is a valiant attempt to provide an all-embracing small business package at a down to earth price; it fulfills all its promises, and there's nothing cut-rate about the facilities it provides. – **Viewfax 258 (Prestel)**

BBC Model B and B+	
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3" disc	*£19.95*

The original Mini Office has been recognised as an astonishing bargain for anyone looking for a low-cost introduction to serious software. Now the four programs which made it up have been substantially enhanced and two new programs have been added. The result, Mini Office II, is more than just an introduction to serious software applications. It's good enough to fulfill the entire software needs of many a small business! . . . The range of features in each program is astonishing for a package of this cost . . . The spreadsheet is every bit as good as a program such as MasterCalc which costs more than the entire Mini Office II . . . This delightful little program [Graphics] allows you to produce professional looking charts to illustrate a set of figures. – **Amstrad Action**

The word processor is literally overflowing with excellent features . . . The database is very easy to use yet extremely powerful . . . The spreadsheet program is the next little gem . . . Having used Mini Office II for the past few days I cannot praise it too highly. – **Popular Computing Weekly**

DATABASE SOFTWARE

Order form on Page 167

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Mike Bibby
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on the BBC Micro & Electron

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on the BBC Micro

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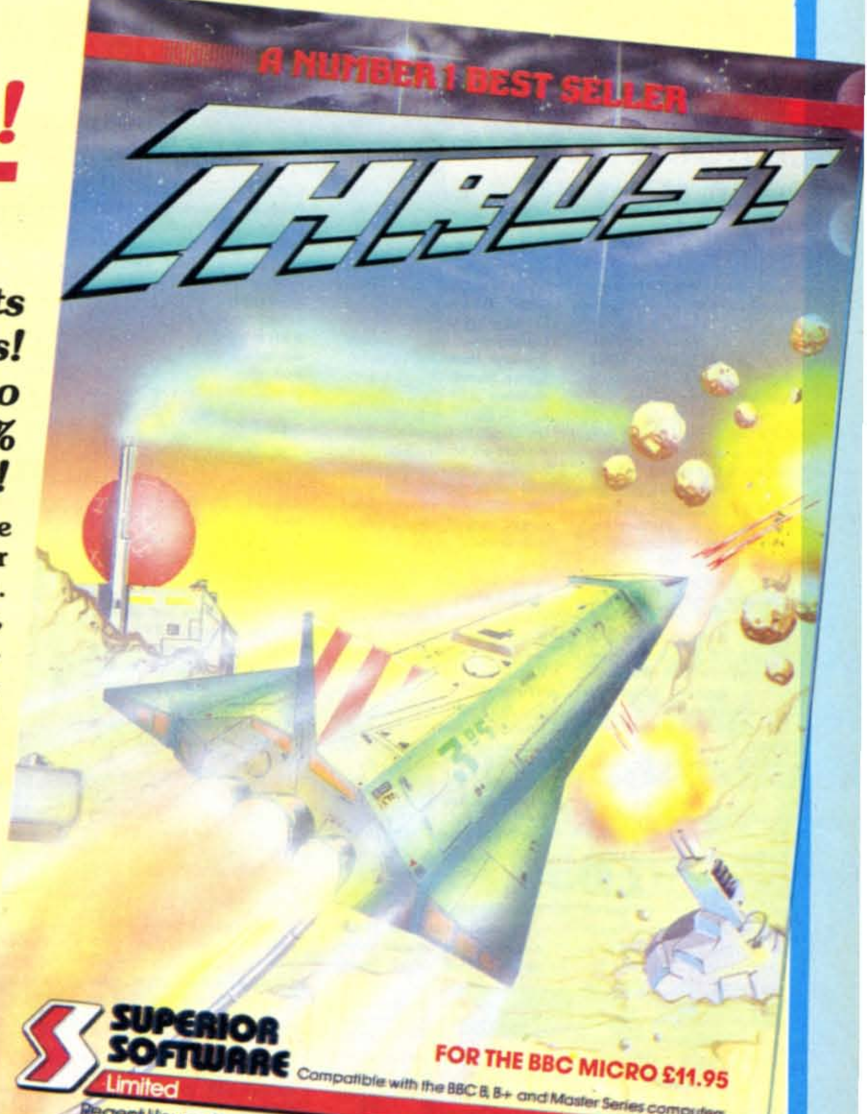
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MARCH 1985: Astromines, space action. **Castle,** two player catapult battle. **Data Maker,** take the tedium out of entering Data. **Disc Search,** string search utility. **Command,** give your BBC and Epson printer the same character set. **Break Key,** disable Break. ***Plus Flex – a machine code game.***

APRIL: X15, sideways-scrolling spectacular. **Mornington Crescent,** fun on the London underground. **Calculator,** AMX mouse mathematics. **Dithering,** colour mixer. **Chatterbox,** speech chip procedures. ***Plus Rabbit Run – a machine code game.***

MAY: Stellar Rescue, arcade action. **Dominoes,** simulation. **Plot69,** fast Mode 2 plot routine. **Musical Events,** a music interrupt utility. **Pound and Hash,** an Epson printer routine. **Sheila,** let your micro run your slide show.

JUNE: Othello, simulation of the board game. **Activities,** word association. **Catnap,** arcade enjoyment. **Simon Quackers,** superb lightpen game. **Shape recognition,** teach your micro to identify. **Stripper,** a routine for removing line numbers. **Epson,** a type-setting utility. **Lprint,** simplifies string output. **Eval,** using the Basic command from machine code.

JULY: Fly, an arcade spectacular. **Draughts,** a superb version. **Compox,** 3D noughts and crosses. **Double Height,** large characters in Modes 0-6. **Clock,** alarm utility. **Compacter,** compress Mode 2. **Inside Basic,** basic routines in machine code. **RAMpage and RAMsave,** sideways RAM utilities. **Video,** graphics to music.

AUGUST: Harbour Command, protect a Cornish town. **Fruit Machine,** a gambler's favourite. **Mouse Organ,** AMX mouse music utility. **Flash,** alternative flashing colours. **String Formatter,** prevent end of line word splitting. **M/C Games,** random number and key detection routines.

SEPTEMBER: Ball Lightning*, tame the lightning. **Quarters,** game of skill. **6502 Games,** a simple arcade game. **Variable Lister,** track your variables. **Smiley Hunt,** Al's game. **Error handling,** the vital routines.

OCTOBER: Karate, superb martial art action. **Solitaire,** all-time favourite. **Scroller,** text scroll utility. **Case,** an ON PROC command. **Disc Scan,** search for disc files. **Adventure,** avoid the vampire.

NOVEMBER: Whodunnit, solve the murder. **Gloop Gulp,** zany arcade action. **Basic Analyser,** take the drudgery of debugging. **Wordwise F/keys,** get the most from your word processor. **Sideways,** sideways screen clear. **New Modes,** Modes 8, 9 and 10. **Disabler,** prevent star command clashes.

DECEMBER: Wizard's Castle*, recover a diamond from the necromancer's lair. **Squares,** 'join the dots' strategy. **McBase,** powerful database. **Alphabet Train,** early spelling. **Basic Analyser,** the vital cross reference tables. **Wordsquare Creator,** to create your own puzzles. **Dumper,** how your programs affect memory. **Subhunt,** the final listing. ***Plus the listings from Body Building and Adventures.***

JANUARY 1986: Megaroids, exciting space action. **Claustrophobia,** can you get out of the maze in one piece? **Fives,** mind bending noughts and crosses. **Music Editor,** translate musical notation. **Wordsquare Solver,** the program to help you solve them. **Find and replace,** find and replace any item of text in a Basic listing. **Discopy,** copy and/or rename files. **S-sound,** sounds into electronic effects. **Alice,** another baffling problem.

FEBRUARY: Tipaka, can you escape the castle in one piece? **USS Endeavour,** fast and exciting action. **Ploy,** brain teasing strategy game. **Up-and-down-loader,** an aid for loading and saving. **Fast Verify,** verif saved disc files. **Disc Assembler,** assemble multi-part source files to disc. **Shift and Echo,** more electronic effects from the Body Building course. **8271,** using OSWORD to format a disc in a special way. **Elite Cheat,** the easy way to the top.

MARCH: Morris Miner, escape the mine in this levels and ladders spectacular. **Poster Puzzler,** a sliding block simulation. **Quicksort,** a fast machine code sort routine. **Character Sets,** create and display your own fonts. **8271,** four programs to complement the last article in the series. **Sound Sampler,** programs from the Body Building course. **Eleusis,** another mind bending puzzle from Alice.

APRIL: Ghouls of Azzod, can you escape from Azzod manor? **Mousetrap,** a simple but infuriating chase game. **Character Sets,** outputting characters using Epsom compatible bit-imaging. **Special Fonts,** create interesting displays with alternative fonts. **Notepad,** forget scraps of paper with this electronic jotter. **Hexer,** a loader for use in the machine code series. **Hyperspace,** another puzzler from Alice. **While Wend** and **While Wend Demo,** two listings from the mail pages.

MAY: Cavern Quest*, can you collect the diamonds before your oxygen runs out, avoiding the falling boulders as you go? **4-Site,** a 3-dimensional adaptation of noughts and crosses. **Catalog II,** disc operations achieved quickly with a single key press. **Taming the Tube,** turning the 6502 second processor on and off by software. **Character Sets,** creating slim characters for use in Modes 2 and 5. **Alice,** another intriguing puzzle from our adventurer.

JUNE: Pendragon*, can you keep the evil yellow perils away from the sugar cubes, while positioning the four diamonds? **Spacebase,** you must defend Earth from the invading hoarde of aliens. **Rainbow,** this lightpen graphics utility will keep you happy for hours.

JULY: Royal Wedding, celebrate the most exciting royal event of the decade with this superb sliding block puzzle. **Dual Catalog,** This utility provides 56 files on one side of a disc. **Viewgen,** what you see is what you get with this printer driver generator for View. ***PLUS digitised picture of Andrew and Sarah (disc only).***

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AUGUST: Fruit Worm, can you survive the dangers of the deadly garden? **Upper,** force all your input into upper case. **Inkjet,** a printer test and two screen dumps for the ink jet printer. **Safer,** prevent accidentally overwritten files. **Hash,** a suite of programs illustrating searching techniques. **Geiger,** the software for the Body Building course.

SEPTEMBER: Pear Picker, avoid Plastered Patrick in your attempts to become a professional fuit picker. **Basic Events,** control events from Basic. **Learner,** teach your word processor to remember those key sentences. **View Preview,** a useful program to preview pages of View files. **VDU19,** programs to demonstrate the illusion of animation. ***BONUS PROGRAMS: Rockfall and Any Questions (Mathematics and General studies).***

OCTOBER: Witch Hunt, search for the 42 keys of Transportal. **Coloured Lights,** an educational program to explain the GCOL effects. **Mode 7 Dumps,** screen dumps for Epson compatible or Olivetti Inkjet printers. **Text Compressor,** a clever utility to get long messages into short memory. **Auto Run,** star run Basic programs. **Weather Vane,** the program to complement the Body Building wind direction project. ***BONUS PROGRAMS: Quasimodo's Quest and Any Questions? (Music and Computer Studies).***

NOVEMBER: Maltese Cross, play this superb domino simulation. **Life,** the generation game to produce colourful patterns. **Star Print,** a clever routine to give easy access to print styles. **View Ruler,** a handy program to provide View with a cursor on its ruler line. **Shadows,** an educational program to throw some light on the subject. **Dual Screens,** a routine to store two screens in memory at once. **BOS Editor,** a superb on-screen editor for Basic programs. **Body Building,** three programs for your pressure sensitive devices. ***PLUS three more files for Any Questions (Office practice, DIY, and Tables).***

DECEMBER: Santa's Sleigh, help Santa in his gift warehouse – but watch out for the monster spider. **Christmas Box,** a superb game of logic to test the old grey matter. **Tables,** take the tedium out of multiplication tests with this short but effective routine. **Flood Fill,** a versatile fast fill routine. **Scroller,** a machine code program to provide fast scrolling in any direction. **Speech,** a software utility to get your micro to talk back to you. **Break Recover,** hold on to variables when Break is pressed. **Body Building,** software for the relative humidity measure. ***PLUS Two more files for Any Questions (Arithmetic and Home Economics).***

** Not Master compatible.*

B+ ✓
M ✓

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Harbour Command	Aug	2161/64				
Ball Lightning*	Sept	2165/68				
Karate	Oct	2169/72				
Whodunnit	Nov	2173/76				
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	1986					
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2221

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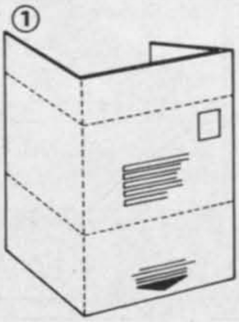

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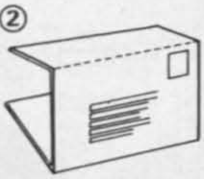

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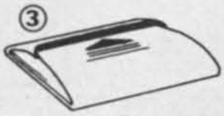

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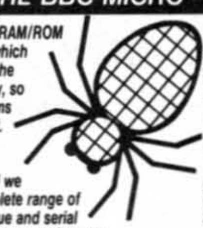

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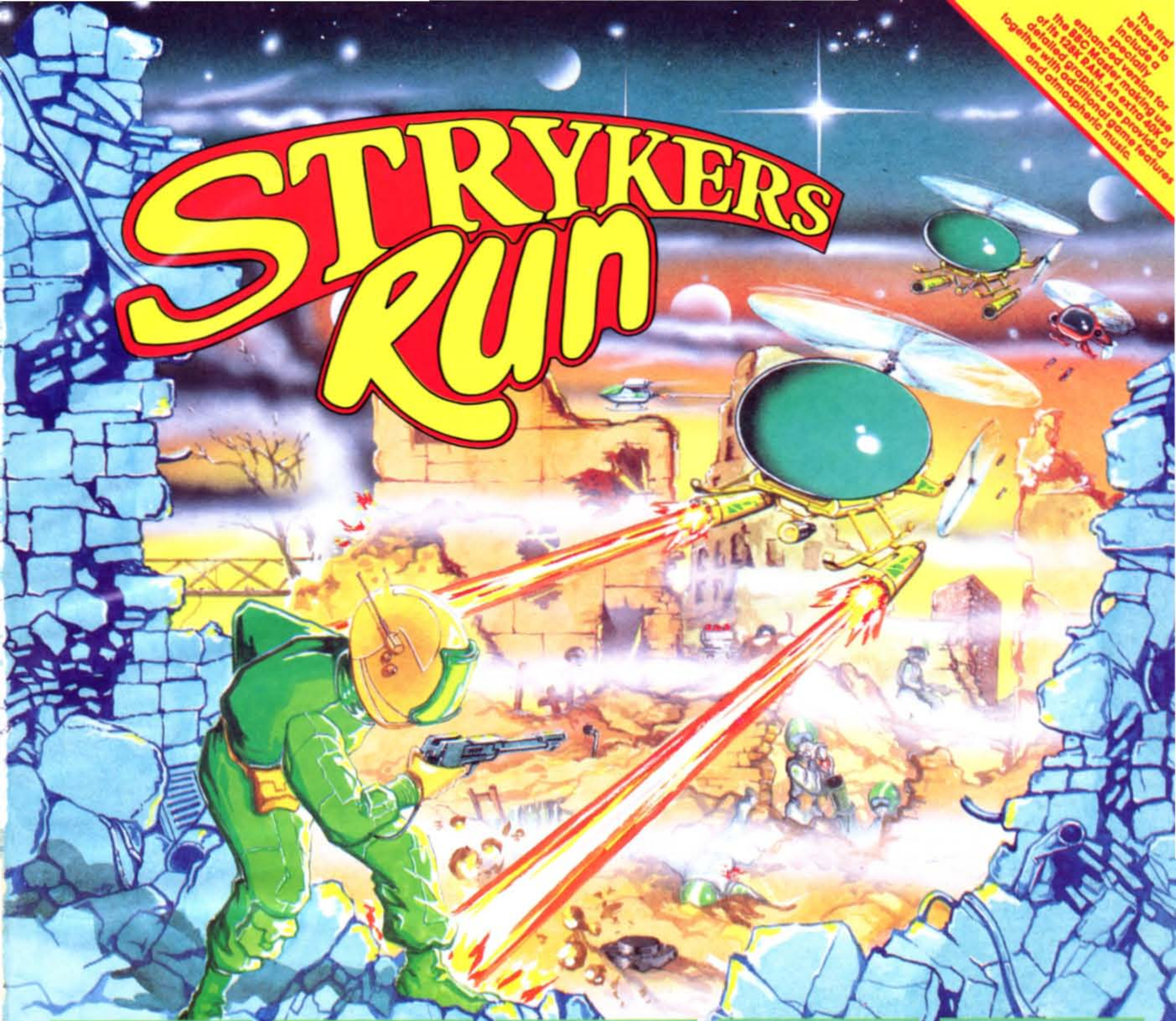

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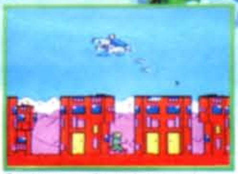
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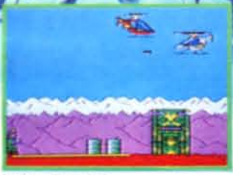
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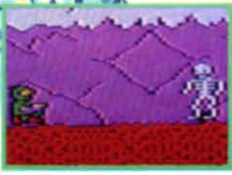
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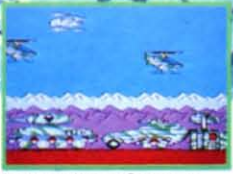
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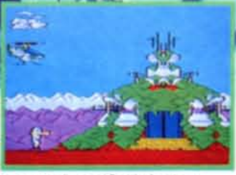
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For many years, a war has ensued between the Allied Nations and the Volgans. The battle was reaching a stalemate position, but recently the Allies through good intelligence work and some luck have managed to obtain the plans of the Volgan's next offensive. If the Allied Forces can capitalise on these plans they can end the impasse and the war. You play the role of Commander John Stryker commissioned to take this top-secret information to the Allies' HQ.

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Game Author: Chris Roberts.

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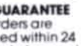

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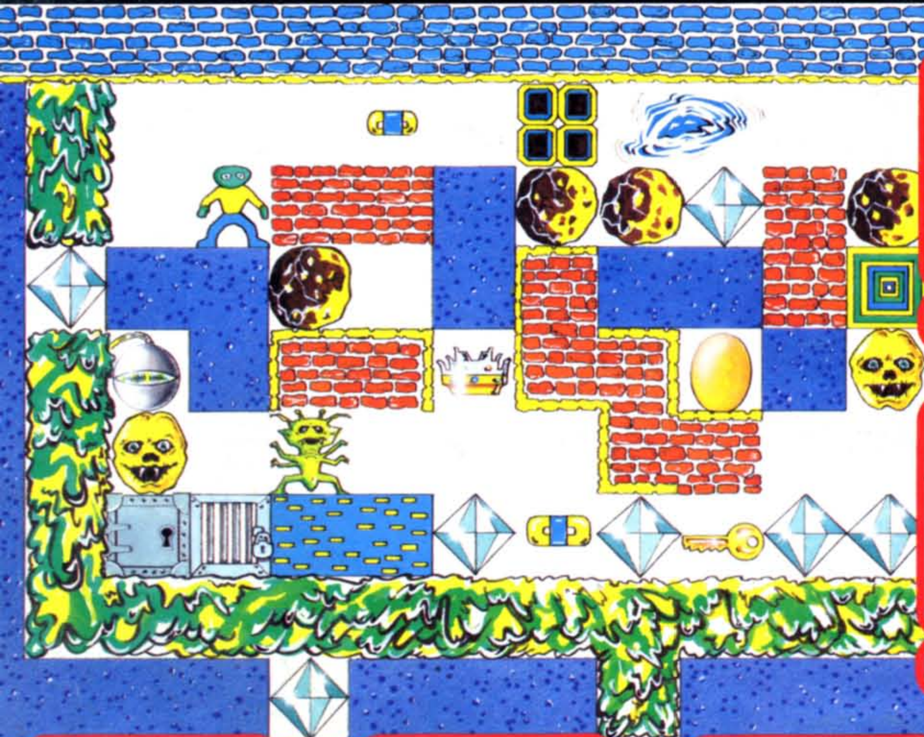
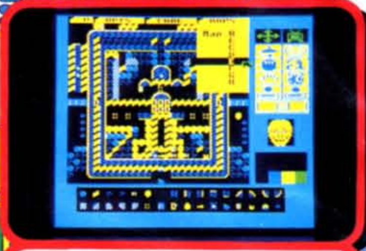
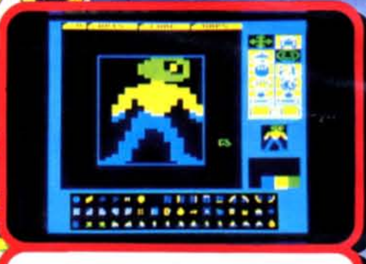


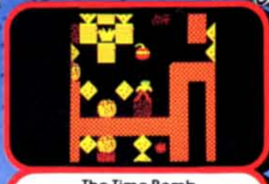


The Screen Editor.



The Character Editor.

Being pursued by a Monster



The Time Bomb is located

The Poisonous Fungus grows insidiously

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